The Builder.

VOL. XXXV. No. 1774 SATURDAY, FEBRUARY , 1877.

ILLUSTRATIONS.

The Proposed New Imperial Court Theatre, Vienna.—Prof. Gottfried Semper & Baron K. von Hasenhauer, Architects... 108

New Municipal Buildings, Reading, Berkshire.—Mr. Alfred Waterhouse, Architect 109

CONTENTS.

The *Life* of Sir William Fairbairn 97
The Value and the Cost of Water 99
The Architectural Museum: Designs for Goldsmiths' Work 100
A House-Building Dispute 100
"Terra Metallic Facings" 100
The General Water-Colour Exhibition: Dudley Gallery 101
The Adaptations of Art 101
Giotto's "Gospel of Labour" 101
Revivalism or Progress? 102
Floating Swimming-Baths 103
Surveyors' Charges under the Ecclesiastical Dilapidations Acts 103
An Artist's Sale in Paris 104
The Temple of Diana at Ephesus 104
A New Workhouse for Camberwell 105
Architects' Benevolent Society 105
Surveyorship Items 106
The Metropolitan Board's proposed Street Improvements, 1877, and the National Gallery 106
The New Imperial Court Theatre in Vienna 106
The New Municipal Buildings, Reading 111
Modern Building in the City: Architectural Association 111
Riparian Ownerships: Lambeth Floods 114
The Thames: Counter Embankment on South Side 115
The History of the British Artisan 115
Architectural Societies 116
What is a Bridge? 116
Commissions 116
Evans & Swain's Fireproof Construction for Floors, Ceilings, and Roofs 116
Northumberland Avenue 116
Granite Building 117
Interference with Street Levels: Fulham Board of Works v. Metropolitan District Railway 117
A Caution 117
"Lodging Money" for Builders' Workmen: Broderick v. Hodgson 117
Wooden Houses 117
Board School, Keymer, Sussex 117
Iron and Gas Tar 117
Probationers at the Royal Academy 117
Books received: Amongst Machines, a Book for Boys (Tribner); The Aquarium (Hardwicke); Gold (Chatto & Windus); Variorum 118
Miscellanea 119

*The Life of Sir William Fairbairn.**

IT is fortunate for, at all events, the professional reader, that the bringing before the public of the life of Sir William Fairbairn has been entrusted to a writer on mechanical science, and familiar with the work of the engineer. Mr. Pole has given us a book which will take its place on our shelves beside the Autobiography of Sir John Rennie and the Life of Isambard Kingdom Brunel. It is a contribution, and one of no little value, to the history of engineering. We need not even qualify the expression by the limitation of engineering in Great Britain. The study of practical mechanics has been so far advanced by the sound sense and thorough investigations of Fairbairn, that whenever a full history of the progress and advance of that branch of learning is written, his name must head a not unimportant chapter. It is thus the more important that a biography, even when much of it is in the form of autobiography, should be edited by a man who is able to appreciate the most salient characteristics of the person portrayed, as is the case on the present occasion.

Of course the part of the book that will be read with most interest is the autobiographical portion. To that we refer our readers, with the promise that from its perusal they may derive both great pleasure and great profit. In artless, but noble language, Fairbairn has revealed himself as a worker,—a man of great reflective and judicial power, of indomitable resolution, and of a buoyant and happy spirit, that shone only the brighter for the fanning of the tempest of trouble. Mr. Pole has, we think wisely, made no attempt to pitch his own part of the book in the same key as the recollections of Sir William Fairbairn. There is thus, it is true, a certain irregularity and want of unity in the book, if regarded as a literary work. But, what is more to our present point, the different great investigations which Fairbairn did so much to advance, are carefully illustrated and explained. The personal history is the most interesting to the autobiographer, and will no doubt prove so to the general reader. But the professional history is that which is most important, as far as the study of mechanics is concerned; and in the later periods of Sir William's life, when his labours were recorded in the form of separate literary productions, the autobiographical recollections are naturally few, or wanting. This defect in the completeness of the personal narrative has been supplied by Mr. Pole, on a scale appropriate to the detail of the book. And such full and precise references are given to the publications of Fairbairn himself, the whole being rendered of more value by a careful index, that we have grounds to congratulate the editor on having supplied a valuable addition to the standard library of the engineer.

William Fairbairn was born in the town of Kelso, in Roxburghshire, on February 19, 1789. His father was descended from a respectable though humble class of small lairds, or, as they are called, "portioners," who farmed their own land. But his mother came of a blood of no ordinary temper. She was a descendant of the border Douglases; and when we reflect on the grand "staying property," which was a main characteristic of William Fairbairn, we cannot but recall the historic name of "Archibald Bell-the-Cat." Another of our workers in iron to whom we owe more than is usually known of the progress of structures in this metal, was maternally derived from the same source. The mother of the late Sir Charles Fox was a Douglas, a noble and venerable woman, whose memory may be recalled in the same words that are applied to the mother of Sir William Fairbairn,—"She was a tall, handsome, commanding woman, and lived to a great age." Like Fairbairn, Fox was a born-engineer. His father was an eminent surgeon, and when the boy was first admitted to the dissecting-room his disappointment was great, as he had expected to find the human body full of wheels and springs. Fairbairn's first practical work was the construction of a little wagon with four wheels (the grandfather of the perambulators that now cumber our streets) for the conveyance of his little brother Peter, a child of fifteen months old, whose nursing devolved upon William and an elder sister. With an old saw, a knife, and a gimlet, a piece of thin board, and a few nails, the future engineer managed to make a respectable wagon, which, though frequently out of repair, was, he says, better than could have been expected. The greatest difficulty was in the wheels, which he surmounted by cutting sections from the stem of a small alder tree, and burning holes in the centre, to receive the axle, with a red-hot iron.

From wagon-building William Fairbairn proceeded to ship-building, thus indicating, in his boyish pursuits, his natural leaning towards an occupation the character of which he did more than perhaps any other man to transform and improve. In the formation of little boats and ships, he tells us that he became an expert artificer; and he not only built, but rigged and sailed, his miniature fleet. From shipbuilding, he proceeded to the construction of wind-mills and water-mills, of which he had sometimes five or six in operation at the same time. They were all made with the knife. The water-spout was composed of the bark of a tree, and the mill-stones were represented by discs of the same material. Arithmetic, bookkeeping, and a small smattering of mensuration, constituted the whole extent of education William Fairbairn ever received as a boy. He makes the sole exception of three months spent under the care of his uncle, William Fairbairn, at Galashiels, where land-surveying and committing the Psalms to memory appear to have been the chief additions to his studies. But the term is unjust. Up to the age of fourteen,—and as far as imparted instruction is concerned,—there is no doubt that the education of Fairbairn was of the most limited nature. But when, having entered his fifteenth year, he became aware of his own deficiencies, and set to work systematically to remove them, he became, as he says, both scholar and schoolmaster. He had, in consequence, such a master, as far as thorough conscientious demand for labour was concerned, as few scholars could boast; and his progress was accordant therewith. He arranged his evening studies with a very wise forethought. Monday was devoted to arithmetic and mensuration; Tuesday, to history and poetry; Wednesday, to recreation and reading novels and romances, thus feeding that portion of the mind, the imagination, to which all really great workers owe so much. Thursday evening was devoted to mathematics; Friday, to Euclid and trigonometry; Saturday, to recreation and sundries; and Sunday, to church-reading, and recreation. For a boy of fifteen to strike out, and to carry out, such a well-ordered course of study may in itself be regarded as a phenomenon. The wise interposition of recreation at appointed times, the study of the noble diction of Milton, the relief afforded to the mind by the fascination of works of fiction, were so many direct means, both of preserving that buoyant health of brain on which so much of the happiness and of the success of the subsequent career depended, and of forming that clear, vigorous, and at times racy and humorous style, which we meet in Fairbairn's writings. It is very rare to find a man who can use other tools adroit in the use of the pen. It is very rare to find a man write good English who is entirely innocent of any study of Latin or of Greek. The study of Euclid is, there can be no doubt, one of the best substitutes for grammatical studies, both as a means of training to the mind, and as a model of logical sequence of arrangement and of deduction. Thus between Euclid and Milton Fairbairn so well employed his time that in the compositions of his later life there is but little that betrays the writer's unacquaintance with Virgil, with Cicero, and with Homer. Letter-writing, under the influence of a youthful and transitory love-fever, was another means of self improvement diligently pursued.

From the age of fourteen to that of twenty-

* The Life of Sir William Fairbairn, Bart., F.R.S., LL.D., D.C.L., &c., partly written by himself. Edited and completed by William Pole, F.R.S. London: Longmans. 1877.

one William Fairbairn was occupied as an apprentice millwright at Percy Main Colliery, in the county of Northumberland. Here, after passing a time in the workshop, he was placed in charge of the steam engine and pumps; and very severe his duties must have been. He became at this time intimate with George Stephenson, who had charge of an engine at Willington Ballast Hill, only a mile or two from Percy Main Colliery. The men were of congenial dispositions; and their friendship endured through life. But the good effect of self-education on the Scottish engineer was far more apparent, in after life, than on his English friend.

Having contracted an engagement, which in due time led to an unusually happy married life, William Fairbairn embarked on a collier, at North Shields, on 11th December, 1811, with a new suit of clothes, half a dozen new shirts, a watch, and four pounds of money in his pocket,—all of his own earning,—for London, and for the pursuit of fortune. From that time till the winter of 1813-14,—the period of the great frost,—he sought her in vain, with much wandering, and undergoing many hardships. The friendly welcome which Mr. Rennie gave to the young Scotch millwright, to whom he offered employment on the works of Waterloo Bridge, was rendered unavailing by the tyranny of the Millwrights' Society,—a body which at that time strove to exert the same control over both workmen and masters which, forty years later, was attempted by the Executive Council of the Amalgamated Society of Engineers. This cruel suffering from a capricious rejection by the Millwright Society, when he stood on the threshold of his independent life, was not forgotten when Mr. Fairbairn, in 1851, earned the congratulations of the Earl of Shaftesbury for having taken the "bold, manly, and righteous course of resistance to this Louis Blanc conspiracy of the mechanics and engineers." Having been nearly starved in London, Fairbairn proceeded,—to call a spade a spade,—on the tramp, to Cheshunt; and after working on a windmill in that neighbourhood, and saving a few shillings, obtained employment, first, on a patent ropery at Shadwell, and afterwards with Mr. Penn, at Greenwich. He had learned at Cheshunt the existence of two societies, rivals of the one which had barred his employment by Mr. Rennie, the three being called the Old, the New, and the Independent Millwrights' Societies. He obtained admission as a member of the last. All the three societies exerted a supervision over the hours of labour, which were from light to dark in winter, and from six a.m. to six p.m. in summer, with two hours deducted for refreshment. Nor was any man allowed by either society to work for less than 7s. a day. By the beginning of 1813 Fairbairn had laid by 20*l.* out of his wages, which he expended on the model of the precursor of the present steam plough. The work proved unremunerative from want of capital to carry it out. Having retrieved his loss, to the extent of 7*l.*, by the construction of an elaborate and effective sausage-machine, he started in April, 1813, for a tour in the south of England. Coaching it to Bath, he proceeded thence on foot to Frome, Bradford, Trowbridge, Bristol, Newport, and Cardiff, and thence sailed for Dublin, where he arrived, after a voyage of four days, with the sum of 1½*d.* in his pocket. In Dublin he obtained work, in making patterns for nail-machinery, at the Phœnix Foundry. In October he sailed for Liverpool, and reaching Manchester after a couple of days spent on the banks of the Mersey, found the true field for the development of his talents.

At Manchester he worked for two years for Mr. Parkinson, and subsequently as draughtsman for Mr. Hewes. During the former employment he married. In November, 1817, having had some disagreement with Mr. Hewes as to the design for a bridge, he resolved to become his own master; and sending round his cards, in association with an old shopmate, James Lillie, obtained an order for the erection of a callender in Cannon-street, and of a calico-polishing machine in Shakspeare-street. On the strength of these orders the partners hired a shed for 12*s.* a week, erected a lathe, and with the assistance of a sturdy Irishman to turn the lathe, contrived to turn and to finish the work in a very creditable manner. The next piece of good fortune was the execution of some millwork for Messrs. Murray, large cotton-spinners, in a manner which gave such satisfaction that the Murrays warmly recommended the young millwrights, and a career was thus commenced which led to the rise of one of the principal manufacturing engineer establishments in England. Mr. Fairbairn's career can hardly be called unchequered, even after he was on the fair way to wealth and renown. It would have crushed a man with less backbone and pith to lose the large sum of 100,000*l.* by the attempt to establish the business of iron shipbuilding on the Thames. Fairbairn not only lost that sum, but afforded to lose it; and yet to retire from business in due time with an ample provision secured by his genius and perseverance.

It was not only by acting as a manufacturing engineer that Fairbairn was able at once to make his mark. His work as such was sound and thorough. But he was never contented to copy. He scorned what he thought the servile habit of taking notes of other men's works. He brought all the energy and perspicuity of his mind to bear on the true mechanical conditions of any practical problem brought before him. Thus in Mr. Murray's mills, by the introduction of light shafts, driven at much higher speed than had previously been attained, he effected such a saving in time and in power as to lead to a change which gradually abolished the practice of work on Sunday,—the whole of which day had up to that time been occupied by repairs of the clumsy machinery superseded by the genius of Fairbairn. It is characteristic of the man that a success, on the strength of which so many men would at once have set up a claim to be regarded as public benefactors, is only modestly and incidentally mentioned in his autobiography.

At the end of five years of hard work, during which the erection of a new mill for Messrs. M'Connel & Kennedy, then the largest cotton-spinners in the kingdom, was a principal item, Messrs. Fairbairn & Lillie found themselves worth, in material, stock, and tools, the sum of 5,000*l.* They now went to the extent of buying a small piece of ground, and erecting a sixteen-horse-power second-hand Boulton & Watt steam-engine to drive their machinery, the cost of which they covered within two years more. In 1824, Mr. Fairbairn was applied to to construct water-wheels for the Catrine Cotton Works, in Ayrshire, where he designed and erected two powerful wheels, each of 50 ft. diameter, and yielding a power of 120 horses,—240 horse-power in all. These wheels were started in June, 1827, and their unexampled success led to the employment of the makers on the only water-mill in Switzerland. The fame of the firm of Fairbairn & Lillie thus spread on the Continent. By 1830 their stock-book showed a balance of nearly 40,000*l.* in their favour, and left them enough capital to build a foundry and increase their works, until they were capable of giving employment to upwards of 300 hands. In April, 1830,—on the proposal of James Walker, Robert Stephenson, and John Farey,—William Fairbairn was admitted as a corresponding member of the Institution of Civil Engineers.

The next subject which engaged the very careful attention of Mr. Fairbairn was that of the applicability of iron to ship-building, and the possibility of applying steam-power to traction on canals. Experiments were conducted on the Forth and Clyde Canal, and the result was published by Mr. Fairbairn, in 1831, under the title, "Remarks on Canal Navigation." The *Lord Dundas* was the name of the little vessel constructed by Fairbairn for these experiments. She was 68 ft. long, 11 ft. 6 in. in beam, and 4 ft. 6 in. deep; drawing 16 in. of water. She was built of iron plates, about 1-16th of an inch thick, strengthened with light ribs of angle iron and T iron, and fitted with cabins fore and aft. The engines were on the locomotive pattern, with two cylinders, and of about 10 horse-power. It worked a single paddle-wheel, 9 ft. diameter and 3 ft. 10 in. wide, placed a little aft of midships, and intended to make fifty or sixty revolutions per minute. This wheel worked in a trough extending fore and aft, to allow of the flow of water to and from the paddles. The whole weight of boat and engines was 7 tons 16 cwt. With this boat a speed of ten miles per hour was obtained on the Mersey. But on the narrow cut from Runcorn to Warrington, so great was the surge raised a-head, that six miles an hour was the highest rate attainable. At the speed of five miles and a half per hour the *Lord Dundas* steamed beautifully, and at that rate she carried passengers from Port Dundas, Glasgow, to Port Eglintown, Edinburgh, for upwards of two years. As regarded the attempt to vie with the speed of railways on canals, the experiment was a failure. But as a step in the progress of shipbuilding, and as a proof of what can be done on the water at low speeds, the value of the experiment is of the first order. So convinced was Mr. Fairbairn of the future course of the shipbuilding trade, that he bought a plot of land at Poplar, and established, in 1835, a shipbuilding business on the premises. In the following year he had orders for twelve iron vessels for navigating the Ganges, and for four for other parts of the world. Orders subsequently were undertaken for the Admiralty, for the Emperor of Russia, for the King of Denmark, and for the mercantile marine service, and nearly 100 vessels were built at these works during the thirteen years for which they were carried on by Mr. Fairbairn. But opposition was keen; experience had to be purchased; the charge of the Manchester works and a visit to Turkey diverted much of the personal attention of Mr. Fairbairn from the Thames works, and in 1844 he closed them, selling what had cost 50,000*l.* in erection for 12,000*l.*, and sustaining a total loss of 100,000*l.* by the enterprise. The whole of this was made good by the profits of the business in Manchester.

We have little room left in which to refer to some of the chief services rendered to science by Sir W. Fairbairn. Among these were the experiments and investigations on hot and cold blast iron conducted with the aid of Mr. Eaton Hodgkinson, for the British Association; the improvements introduced in the manufacture of steam boilers, and the foundation of the Association for the Prevention of Boiler Explosions; the investigations with regard to the conduction of terrestrial heat, aided by a grant from the Royal Society; those on the tendency of tubes to collapse; on the strength of glass; and on the properties of steam; and, not least, the large share of responsibility and of merit due to Mr. Fairbairn in the construction of the Holyhead and Conway tubular bridges. At a period of life,—between seventy-three and seventy-nine,—when few men commence new studies, Fairbairn brought his great experience and thorough powers of penetration to the aid of the Government, in an investigation of the application of iron to defensive purposes in warfare. He thus contributed, perhaps more than any other man, to the development of the two stages through which the marine architecture of Europe so rapidly has passed and is passing; namely, the substitution of iron vessels, made of thin plates, for wood, as being practically lighter and cheaper; and, secondly, the setting afloat those ponderous batteries of teak and iron between which, and the tremendous ordnance intended to arm and to oppose them, an internecine warfare is now being waged.

Mr. Fairbairn was elected a Fellow of the Royal Society in 1850; his inquiries into the comparative strength of hot and cold blast iron; his investigation of the properties of all the irons of Great Britain, and of the Samakoff Turkish iron; his essay on the consumption of fuel; that on the most economical method of raising water from mines; and his papers on the strength of wrought-iron tubular bridges and girders, with a description of the Conway and Britannia tubular bridges, being cited in the certificate of election. In 1851 he succeeded Sir Mark Isambard Brunel as a Corresponding Member of the Mechanical Section of the French Academy of Sciences. In 1860 he received the Royal Gold Medal of the Royal Society. Declining, in 1861, the honour of knighthood in a letter of singular simplicity and dignity, he accepted, in 1869, the well-earned distinction of a baronetcy,—an honour at once to the self-made man of science and of practical work, and to the order of which he became a member. Of his early suffering from the action of the Millwrights' Association, and of his consistent opposition to claims on the part of a portion of the men engaged in the trade of the engineer to dictate terms to the whole, we have spoken; but it should not be forgotten that it was a strike of the boiler-makers which led to the invention of the riveting-machine, patented by Mr. Fairbairn, in the name of his assistant, Mr. Robert Smith, in 1837. "This machine effected a complete revolution in boiler-making and riveting, and substituted the rapid and noiseless work of compression for the eternal din of the hammer, besides making the work far superior in quality and in strength." In August, 1874, full of years and of honour, Sir William Fairbairn died. His funeral was attended by between 50,000 and 70,000 people. Let those who would know more of his grand career, or who would imitate his noble example, read, and read again, the record of his life.

THE VALUE AND THE COST OF WATER.

THE recent plague of immoderate waters is a subject which, coming so directly home as it does to almost every one, makes an inquiry into the value and cost of water extremely pertinent. We have felt, or seen, or at least heard, much lately of the action of water as an enemy. But in nine cases out of ten, at all events in England, it is entirely due to human neglect and improvidence that water ever becomes anything but a benefit. We measure, to some degree, the mischief caused by floods. We see the noble totals of voluntary subscriptions so readily contributed to alleviate the distress caused by some of the most disastrous inundations. We are able to compare (with gratitude, let us hope) the worst evil wrought by flood in our own country with the effects of that mighty cyclone, or, perhaps, earthquake wave, which recently rushed over the delta of the Megna, and out of tens of thousands of overwhelmed inhabitants left few alive to tell the tale. With all this we are familiar. We are almost induced to look upon the water genii as akin to the capricious and malignant Kuhleborn of that most fascinating of all imaginative tales, the "Undine" of De la Motbe Fouquet, or to regard the rivers and streams to which we owe the entire vegetable produce of the country in much the same light attention as the Nether-lander regards the sea, beneath the level of which his audacious and untiring industry has reaped so many a harvest. It is time for some one to say a word on behalf of water.

We cannot lose sight of the fact, trite though the remark may be, that water is the mother of all organic life. Without it, neither vegetable nor animal species can exist, or have ever existed, in our planet. The earlier forms of life, indeed, both animal and vegetable, whether we trace them back in the stony leaves of the geologic record, or whether we push our analysis, by aid of the microscope, as far as our powers enable us, towards the infinitely little, are aquatic in their habit. Corals, sponges, *foraminifera*, all the simple forms which the early geological seas brought forth abundantly, are aquatic. So are all the most ancient types of inarticulate, articulate, and vertebrate animals. So is the entire fauna of the palæozoic period. No trace of an air-breathing animal has been found of a date prior to that of the carboniferous system, when terrestrial vegetation also first became a great characteristic of our world. So, again, at the present day, in those arid districts which are watered by no river, and shaded by no lofty, cloud-attracting mountains, life becomes more and more rare with the expansion of the desert, until at last not even the heat-loving locusts spread their purple wings before the traveller. The great desert is far more hostile to life, and far more dangerous and difficult to travel over, than is the great sea.

Regarding water, then, in its proper character of an indispensable requisite for the sustenance of life, whether vegetable or animal, as far as our knowledge of organised species extends, it may be instructive to inquire what is the cost at which it has been found worth while for man to procure this precious fluid, and what may be called the productive value of water when it is supplied, in measured quantity, by means of the toil and skill of man.

A really cheap provision of water, so far as the times of written history go, is attendant on a high degree of political organisation. It is only by the combined labour of many men that those great engineering works which bring rivers to water dry places can be effected. Such combination of labour, in early times, has only been known to be effected under the constraining energy of regal power. All the great hydraulic works of antiquity are attributed to kings and rulers. The great object to be accomplished in order to supply cheap and abundant water, is to arrest the rainfall at a mountain level of sufficient altitude to allow of the descent of the supply, by gravitation, to the district where it is needed. To effect this object, great and important works are required. It is, however, often the case that, by the concentration of labour in one spot,—as by making a dam which turns a mountain valley into a lake, or constructing a weir which raises the level of a river, all subsidiary work is reduced to a minimum. We have seen how remarkably this is the case in India. The toil of a number of men which, applied without concert or direction, would only ensure a very scanty harvest for a single year, may be enough, when the power of the Government and the skill of the engineer are united, to secure ample harvests for an equal number of persons for a long series of years. We have cases in India where a large outlay,—that of a million sterling or more,—wisely applied, has been enough to insure an annual return of amount equal to the entire outlay. When such is the case we shall find that the cost price of water, taken per million tons supplied, or per hundreds of acres watered, for a series of years, is at a minimum; the economy thus effected being generally in proportion to the magnitude of the work executed in the first instance.

On the other hand, when we find the least degree of forethought, skill, and cost applied to the artificial distribution of water, we also find the cost of the element to be at the maximum; taking account of the mechanical work actually performed. The bullock-wheel or the *picotta*, worked by a single labourer with no apparatus but a plank, a bamboo, and a water-vessel, lifts water to the height of 15 ft. at the cost of eight-hundredths of a penny per ton. This is equal (in matter of figures, but not in matter of actual convenience) to a cost of one-tenth of a penny per ton for a lift of 20 ft. The duty of the best Cornish engines has been rated at 66·6 foot tons per pound of coal; that is to say, that the combustion of a pound of coal under a boiler produces enough steam to raise, by the mechanism of the steam-engine, a ton of water to the height of 66⅔ ft. This is equal, at 9s. 4d. per ton for coal, to a cost of one-twentieth of a penny for that duty, or to raising a ton for 133 ft. instead of for 20 ft., for the tenth of a penny. We shall find by and by, that when the object is not to get rid of water alone, but to convey water to a definite locality, the cost is very considerably more. But we are taking the lowest result of the simplest application of human labour; and we find that it is represented by the decimal ·0053 of a penny per foot ton, or, of a pound sterling for 45,000 tons of water raised 1 ft. This quantity of water is equal to a rainfall of 45 in. over 10 acres of land.

The calculations of the Indian engineers as to the cost of water supplied by artificial means are made by allowing 7 per cent. on the capital laid out on the works as the annual cost of maintenance and interest. At that rate they find the cost of water supplied by gravitation from tanks and lakes to be from 40,000 tons to 66,000 tons per pound sterling; and of water supplied from permanent canals leading from rivers, to be from 20,000 to 70,000 tons per pound sterling. In this case the gravity of the water supplies its own moving power, while in the case of of the water raised by human toil, or by bullocks, we have had an actual lift to be overcome. The average of the prices quoted for the usual supply does not come very far from the price given for raising the water 1 ft.; and this is not extraordinary when we consider that the actual unit of the cost—the labour of the workman—has been the same in both cases. The foot of rise acquired would be enough to give motion to the water for a course of four miles and upwards, and a gradient of equal pitch must be allowed for the channels through which the streams are conducted, when allowed to flow by gravitation.

The quantity of water required per acre for irrigation in India, or in Egypt, varies according to the nature of the crop which it is intended to raise. "In Egypt 26 cubic yards of water per acre per diem are required for the irrigation of land producing summer crops, and rice requires nearly three times that supply. The former quantity" (we cite the last number of the *Edinburgh Review*, in its article on Mediterranean Deltas) "is about equal to a daily rainfall of one-fourth of an inch." In India, according to Sir Arthur Cotton, 1,500 cubic yards per acre are required for what are called dry grains, and 6,000 cubic yards per acre for rice, which is grown (as a journey through the Italian rice-fields will have made many of our readers aware) in an artificial swamp. A comparison of the two rates of allowance gives an average equivalent to a rainfall of ¼ in. per diem for nearly two months (fifty-eight days) in the former case, and of double the quantity, for double the time, in the latter. The crop, however, which consumes most water, according to the rates charged for irrigation in India, is the sugar-cane. The prices now charged for irrigating rice-fields in the Punjaub, by water supplied from the Bari Doab Canal, is 9s. 6d. per acre. That for sugar-cane cultivation, in the same district, is 12s. per acre. For wheat, barley, cotton, and indigo, the requisite water is supplied at 5s. per acre. For other cereals and pulse, the rate is 3s. per acre. The quantities of water respectively supplied are not stated in the blue-book; but from a comparison of the rates, and from the remark made by Sir Arthur Cotton, that an allowance of 6,000 cubic yards per acre for rice covers great waste, it may be inferred that that quantity is about the maximum supplied in the Punjaub. On that estimate the cost of water from the Bari Doab Canal is 2s. per 1,000 cubic yards, or ·024d. per yard. This allows us to fix a valuation price on the rainfall. Six thousand cubic yards per acre is the yield of a rainfall of 60 in. The revenue for an equivalent supply by artificial means is 12s., which makes the value of 1 in. of rain per acre, which is equal to 100 tons of water, amount to 2·4d.

We have thus arrived at a "resistance value" for the supply of water for agricultural purposes, which the native of India (whose wages are probably not a penny per day, where the English labourer receives a shilling) can afford to pay, and actually does pay, for the artificial supply of that precious element, when he fails to receive it from the skies. Nor is it only here and there, for rice-grounds and for gardens, that this payment is made. The increase from the irrigation supplied by the Bari Doab Canal in 1872-1873 was 81,786*l*. This increase is annually augmenting; and is earned by only one of the numerous important works of a similar kind that are in operation or in course of construction in India.

If we apply the information thus obtained to our English circumstances, we shall be able to put a price upon our rainfall. Not, indeed, a maximum price. Such price would be obtained only by attributing to the rain the whole value of the crops which its beneficent supply had enabled the farmer to extract from the soil. But we can ascertain what it would very well remunerate the agriculturist to pay for a supply of water, obtainable at will, of an amount equal to that which descends on his soil from heaven at periods which he cannot control. The area of the Thames basin is 3,313,680 acres. The rainfall over this area has never, since records have been made, fallen short, we believe, of 16 in. within the year. The monetary value thus arrived at is 38s. 4d. per acre. The figure is modest, but yet when applied to the average it amounts to over 5,300,000*l*. That is a minimum valuation,—certainly immensely under the mark,—for the valley of the Thames alone. If we take a mean rainfall of ·26 in., descending on the 77,286,981 statute acres which form the area of the United Kingdom, we have a result of about 20,000,000*l*. sterling as the minimum agricultural value of our rainfall.

If we glance, after this, at the price which, in this country, we actually pay for water, we shall find that it enormously exceeds that charged to the Indian cultivators. The water companies of London have provided works for the service of the metropolis at an aggregate cost of more than twenty millions sterling. They supply daily a mean quantity of some thirty-three gallons of water to each inhabitant, delivered in his own abode. The cost of this supply is 6s. 6d. per inhabitant, or 1·4d. per metric ton of water. When this price of one penny and four-tenths of a penny per ton is contrasted with that which we have been attributing to the agricultural supply of 2·4d. per 100 tons, the latter proves to be only one fifty-eighth part of the former. The Londoner pays for his water supply nearly sixty times as much as the cultivator in the Punjaub pays for his irrigation. The latter, indeed, would starve rather than pay such a price. The return of his labour would not suffice to enable him to do so. Agriculture would be at an end if all water were thus costly. Yet who shall say that the price is disproportionate to the value of the element?

If we look to the actual produce per acre due to a given quantity of water, we have not at hand all the data which are requisite for forming an accurate estimate. As far as our personal acquaintance with the different districts of England are concerned, we are disposed to point to the valleys of the Severn, and of the Warwickshire Avon, which falls into the former river at Tewkesbury, as among the best examples that can be afforded of the efficacy of water in producing grain crops. The two valleys somewhat differ in their physical features, and in the mode in which water is, in consequence, supplied to the growing crops. Both are, indeed, subject to floods, but the meadows of the Avon are generally more permanently wet than are what are called the Severn Hams. The last-named fertile meadow lands are subject to an inundation which more closely resembles that of the Nile than is the case with any other English river. The

gr at want of resemblance is found in the contrast between the great regularity with which the Nile rises, almost to an hour, at the appointed season, under a cloudless sky, and the capricious irregularity of the floods of the Severn, which, moreover, like all our English floods, occur exactly when they are least required; that is to say, in seasons of abundance of rain. This is a circumstance which, perhaps more than any other, accuses us of want of proper management in the storage of our rainfall and storm waters. The supply which, held back for a month or two, would be worth, not its weight in gold, but a sum of which we hope we are aiding our readers to form some estimate, is converted into a cause of disaster by the coincidence of rain and flood. Apart from that, the chief peculiarity of the Severn is, that it has burrowed for itself a bed deep below the rich alluvial plain which it not only waters but efficaciously drains. When the Severn rises and overflows its banks it deposits a rich fertilising sediment over its meadows. When it falls it allows the water, having done its work of enrichment, to run away from the roots of the grass. With this alternate supply, capricious as it is, two good scythe crops may be expected from the Severn Hams. These, in the neighbourhood of Tewkesbury (and we believe of the other riparian towns and cities), are Lammas land. That is to say, they belong to individual owners for a portion of the year, during which the scythe crops are secured. After Lammas-tide they pass into the hands of trustees, and are used for the remainder of the year as grazing ground. Their fertility is very great, and may be estimated at equal to at least three full scythe crops per annum. Of these three, from one and a half to two, in the best years, and from two to two and a half in others, must be credited to the water of the Severn. In the valley of the Avon, on the contrary, the arrangements are such as to render the farmers less dependent on the rise of the river for their irrigation supply. In compensation they have more difficulty in getting rid of surplus water; and the general fertility of the meadows is, we apprehend, less than in the case of the Hams of the Severn.

The actual produce of rice under irrigation in India Sir Arthur Cotton estimates at half a ton of grain per acre, besides straw used for fodder. The latest prices we have seen quoted for rice in India, where it is now unusually high, averaged about 8 rupees a bag of 160 pounds. This is equivalent to a price of 1·2d. per pound, considerably less than half the price for the same quality of rice in England. This gives a return of 5*l*. 14*s*. per acre for the grain, out of which 4*s*. 10*d*., under the old rate of charges in the Punjaub, and 9*s*. 6*d*. under the present scale of payments, has been the cost of water. The return is low compared with those of English agriculture, where ordinarily good land will produce the value of 12*l*. per acre from wheat, and 6*l*. per acre from clover, yielding one scythe crop and one grazing crop. Barley and oats will yield 10*l*. per acre. But the low rate of labour in India has to be taken into account. To produce the yield of 10*l*. or 12*l*. per acre, as much as 2*l*. 16*s*. will have been expended in labour. Of the Indian labour-cost we are without particulars. The proportion of an anna paid to a native workman, where a rupee is paid to an English workman, is given by Mr. Rendel and other authorities,—that is, 16 to 1; but that applies, not to English prices of agricultural labour, but to the high prices paid to skilled English workmen when employed in India. When we compare these with the prices of agricultural labour in England it is obvious that there will be a disproportion, not, perhaps, of 16 to 1, but, still, very considerable. On the other hand, the government under the native princes, and, we believe, still in some provinces of India, took the lion's share of from 60 to 75 per cent. of the value of the crops, so that probably we shall not err in placing the value of agricultural labour in India as low as 12*s*. or 14*s*. per acre even for the most productive yield. The great difference still remains between the small and definite price which insures irrigation when required to the Indian cultivator, and the reliance on the unpriced but capricious supplies of the indispensable element which are derived from the English rainfall.

We trust that the facts which, collected from very various sources, we have thus brought before our readers, may not prove altogether useless. As to the main general idea, that agriculture is dependent on water, there is, of course, no novelty. What we have wished to show is, what price cultivation can afford to pay for a supply of water which, though rarely more, taking the year round, than that which is attainable from our English rainfall, is certain, and under control. There is, no doubt, a large area of land in England to which irrigation cannot, as a matter of practical economy, be applied. On the other hand, there is a considerable area, and that one which comprises the most fertile soil, in which the regulation of the water supply is a matter entirely at the command of the engineer. We cannot, indeed, hope to avert the rainfall from the crops, if a wet season occurs in the time of harvest. We are still obliged to wait for sunshine to make hay, although there is good reason to suppose that the facilities which science has already indicated for artificial hay-making will by and by render this time-honoured adage obsolete. But there is no doubt that we can so order our river valleys as to render damage from floods the exception instead of the rule. And there are plenty of persons who tell us that we can so store up our storm-water as to provide against a season of drought. Into that question we cannot now enter. But that means should be adopted, and may readily be adopted, to prevent the two concurrent evils of the waste of our agricultural resources by allowing so much of our river valley land to remain in a state of swamp, and of causing destructive floods whenever the rainfall ordinarily distributed over three or four months may happen to come down in one or two weeks, we hold to be an incumbent national duty. We suffer in health, we suffer in wealth, we suffer in comfort, from our neglect. We hope that by turning attention to the question of the commercial value of water we may do something to stimulate the activity of those who are now smarting from the recent invasion of their homesteads, or even of their homes, by flood. The question of cost is a simple one. The results of the calculations we have offered are most instructive. We have said nothing of the negative value of water. As to that let every one form his own estimate. But it must be remembered that this negative value is two-fold. In occasional bad seasons it becomes concentrated. Then each man may count for himself what loss has been caused by the floods. But whenever our property is thus injured, there must be a constant, steady, silent loss always accruing from the injury to health and to production arising from insufficient drainage. In a word, we much question whether the total loss caused, say in a century, by floods, is equal to the total loss caused, within the same period of time, by neglect of systematic drainage and irrigation.

THE ARCHITECTURAL MUSEUM.

DESIGNS FOR GOLDSMITHS' WORK.

The designs for gold and silver work made in competition for the annual prizes given by the Goldsmiths' Company are now on view at the Architectural Museum. There seems to be more originality in the collection, and less repetition of old types, than we remember in those of the last two years; though there are still a good many designs which seem to aim at success purely by elaboration of ornament without much thought, and those which are richest are not, on the whole, the best. A splendid set of drawings for a large Gothic centre-piece and vases, &c., is exhibited by Mr. Rice (of Messrs. Hart, Son, & Peard's establishment). We do not altogether sympathise with the style of it, and the tumbling Nereids round the margin of the centre-piece are not very elegant in design, but there is an unusual force and talent in the whole set, which seems (rather to our surprise) to have met with no recognition. Mr. Watkin's large shield design in illustration of Virgil shows a great deal of talent and study in the drawing and disposition of a number of figures, though perhaps with no speciality suiting it for silver work. Of the large number of drawings by Mr. Marshall Crichton, the Byzantine tankard is much the best as a design, showing at once the purest taste and the most originality among his designs; in general his drawings, though very well executed, want originality and force of style, nor can we see any reason for his having (as he apparently has) the first place of merit, except from a mere "silversmith's shop" point of view. His articles are very selling things, probably; but the award of the prizes in this, as in previous cases, suggests that there is no very clear artistic perception influencing the donors. A candelabrum of iron, with silver inlay, by Mr. Aitchison, is good and appropriate; so is a water-bottle damascened in silver by Mr. R. Roberts, and an "Assyrian cup," or ewer, by Mr. Park: the attempt to adopt or imitate these ancient styles seems to have the effect of chastening the taste of the designers, and keeping them from tawdriness of ornament and indecision of line. Mr. J. Eyre's Orpheus cup is not over good in the figures, but there is a thought in it, as also in Mr. Sharp's baptismal font; and the presentation figure for an "Eistedfodd" prize-giving, by Mr. Ellson, is well sketched in a series of views of the figure from different points. A salver, by Mr. Francis, with a scene from "Enid," has merit in the pictorial design. As far as we had time to examine, it does not seem to us that the prizes go to the right persons.

A HOUSE BUILDING DISPUTE.

A jobbing bricklayer, named Broadman, recently brought an action in the Lambeth County Court against a Mr. Burrows, under the following circumstances. On behalf of the plaintiff it was stated that he did building work, but did not find materials. The defendant was a retired publican, and built houses for himself. He had a great number of tradesmen working for him, and many, it was stated, did not suit him. He entered into an agreement with the plaintiff to complete five houses in Evandale-road, Lambeth, the sum agreed upon for the work being 150*l*., all material to be found by the defendant, and a certain sum of money to be paid weekly to go on with. After defendant had paid 131*l*. to plaintiff, he expressed himself dissatisfied with the work, and said he would pay no more money, notwithstanding that there existed an agreement between the parties for the completion of the work. The ostensible reason alleged by the defendant for breaking off the agreement was, that the plaintiff had not built the garden-walls to the houses, although there was no mention of the garden-walls in the contract.

In his examination the plaintiff denied that he had agreed to build the walls for the defendant, or that they were in the plans. Defendant had told him to build some walls 9 in. thick at first; but afterwards gave him instructions to make them only 4½ in.

One of the plaintiff's witnesses, named Wood, said he heard defendant say to plaintiff before the work was commenced that he was not sure whether he would have walls for the gardens or only a fence.

In support of the defendant's case the plans were put in, and the judge, having examined them, said the walls were distinctly shown, and inasmuch as the plaintiff had entered into an agreement to execute the work according to the plans he could not sustain the action, and the verdict would therefore be for the defendant.

"TERRA METALLIC PAVINGS."

Mr. Joseph Hamblet, of West Bromwich, has sent us a few specimens of his bricks for paving stables, coachhouses, and crossings. Their quality seems excellent, and if, as he says, they are coming now more and more into every-day use, we take it for a good sign. They are made by his own patented machinery, and designated 'Terra Metallic Pavings. Mr. Hamblet employs from 320 to 370 hands. The material is crushed between five different pairs of large iron rolls before passing through the brick-making machine.

Society for the Encouragement of the Fine Arts.—At a meeting of this Society on the 25th ult., Mr. H. Danby Seymour delivered a lecture "On the Connexion of Egypt with Babylonia and Assyria, and on Semitism in Egypt." Dr. B. W. Richardson, F.R.S., was in the chair. The lecturer traced the history of Egypt, and the progress of its art through the old and middle empires, calling attention to its principal monuments, and ending by a comparison of the remains found in Egypt and Babylonia, and the reasons which made it probable that the civilisation of Egypt had been originally derived from Babylonia; the pyramid being a form of stage temple, the simple ancient panelling found in the oldest ruin in Babylonia at Wurka (Erech) resembling that found on a sarcophagus of Mycenius, and there being no traces of a stone or barbaric age in Egypt. [illegible]

THE GENERAL WATER-COLOUR EXHIBITION.

DUDLEY GALLERY.

On "private view day" very various are the private views of different visitors as to the standard of the exhibition. One of our companions of occasionally rhyming tendencies embodies his opinion to us in a whisper thus,—

> Pretty's the word,—
> At least it's the highest;
> Much that is pleasing,
> But nought of the highest.

On the other hand, amid the press of visitors who were squeezed together in the room on the afternoon of Saturday last, one might hear, perhaps, from a lady, manifestly of the artist persuasion, a loud and decisive proclamation to the effect that "I call it an uncommonly good exhibition!" a declaration accompanied by a compression of the lips and an authoritative knitting of the brows which left the bystanders no choice but to acquiesce with becoming humility. The facts are perhaps nearer to the first than the second opinion; but there is a good deal to look at, and some things to look at a good deal. Among these Mr. Arthur Severn's bold attempt, called "A Ray of Hope" (385), a stormy beach with a rainbow seeming to come almost down into the foreground, a little too close to the eye, but remarkably luminous in effect. This luminosity, it is true, is obtained in great measure by maintaining a persistent neutral grey in the sea, and therefore savours a little of trick; but the motion and turmoil of the sea is grandly given. The rainbow also, we must observe, takes a curious curve, as if it were seen in perspective; a mistake which has a precedent in the works of Turner, who, if we remember rightly, has somewhere painted a rainbow in the narrow ellipse of an abrupt perspective. If Turner and Mr. Severn had remembered that the rainbow is, as we may say, "all my eye," or at least all in the eye of the spectator, they would have perceived that it must always be a regular geometrical circle, with a plane at right angles to the direction of vision. However, the drawing is a remarkable one, and the artist adds to his laurels by another very fine and unusual piece of effect, "Morning Light at Sea" (66), to which no little thought and study has gone. Mr. Walter Severn is very clever in a different way in his drawing of "Our Boys" (58),—two little fellows in straw hats and knickerbockers, lying on the grass with their heels to the spectators, and very well drawn.

Among figure subjects is a fine powerfully-handled drawing by Madame C. Bisschop, "Mother's Help" (121), which strikes us as one of the best things this lady has ever produced. "A Portrait" (of the artist herself) by Miss Edith Martineau (103) is admirable in its carefully-studied execution and marked character and expression. The same lady contributes another admirable portrait (317). Of a very different class to these are Mr. J. C. Moore's various children's portraits. We have on previous occasions commented on the charming decorative effect which this artist succeeds always in realising in the costumes and accessories of these child portraits; this is especially observable in "Constance, daughter of W. Demain-Saunders, Esq." (90), where the tones of the dress and the tone and detail of the old carved cabinet behind make a delightful combination; "Master Stanley" (330), a little fellow standing before a large arm-chair with a horn in his hand, is also very good; and another small person (105) who has sat for his portrait in his shirt, which gives the keynote to a peculiarly-toned but very successful combination. But in these we cannot help thinking that there is a tendency to let the accessories overpower the faces in interest, and that there is a lack of individuality and diversity of character in the children: we heard the explanation suggested that when an artist has been successful in painting children of a certain type, others of the same type of face are brought to him; there may be something in this.

One of the most powerful drawings in the gallery is Sig. Cabianca's "The Vespertine Walk" (495), which ought to have been far better hung than it is. We look from the high ground adjacent to a convent over the last deep purple of a twilight landscape; some Sisters in their large white caps come slowly home from their evening walk; there is a subdued glow about the whole which is very fine, and altogether it is a work of real pathos. Mr. Arthur Stock's "A Flower for Grand-Daddy" is a good subject (73), but not equal in treatment to what he can do: the face of the old man is the best, as it is the principal, point in the picture. Mr. F. R. Stock's "Marchioness" (204: she of the "Curiosity Shop") is good, but a little too comfortable-looking for the character. Mr. Elmslie has repeated his study of "nigger" life in "Aunt Chloe's Visit" (171), a scene in the life of the better class of "people ob colour" which is clever and amusing enough. We do not see many more figure subjects worth note; but Mr. Parker's "A Morning Chat" (225), and a small study of a sleepy old crone by Mr. Walter Wilson (586), on one of the screens, should be looked at; and Miss Kate Greenaway's little procession of children on the same screen (562).

Among landscapes, besides those already mentioned, there are a good many things to look at. Among these Mr. Knight is at his best in "Twilight" (324), a large carefully-studied evening effect in his usual vein, but not too much a repetition of what he has done before. Mr. Albert Goodwin's two powerful sketches, "The Delectable Mountains" (196), and "The Skirts of the Nile" (612), show his remarkable versatility and concentration in giving the characteristic feeling of scenes of such a different nature; the former, where we look down from a hill in the foreground on to the dark purple water of a loch, is, though little more than a sketch, complete in its translation both of the feeling and of the contours and tones of the hills. Mr. Ernest Waterlow contributes a powerful but rather crude piece of effect in "The Hill Farm" (112); his less important work, "Through the Fields" (414), has, to our thinking, a truer feeling and style. Various drawings by Mr. Frank Walton have decisive originality, "Under the West Cliff, Bournemouth" (205), in particular, though open to the charge of hardness. Mr. Macallum has gone beyond his usual excellence in his coast scene (220), in which there is much truthfulness of colour, with a very real and bright effect of sunlight; and Mr. Henry sends a good specimen of his well-known style in "The Port of Shields" (290). Among others that we noted for special qualities are several by Mr. S. J. Hodson, Mr. Aston's "Low-tide Sands at Budo" (143), Mr. Dearle's "Haymaking" (164), Mr. Glennie's "Ben Nevis" and "A Study in Glencoe" (106, 183), Mr. Macbeth's "Rye" (251), an unusual little study; Mr. Long's "A Fresh Day" and "Plashing for Trout" (269, 359), the latter a very interesting study of trees, with a kingfisher making the single point of bright colour in a dark scene; Mr. Walter Field's "Waste Land" (310); Mr. Walter Crane's fine little "Sketch at Whitby" (623); and others by Mr. H. Moore, Mr. Ditchfield, Mr. Addison, &c.

The studies of Mr. Earle in the Venetian flower and fruit market claim recognition, but they do not seem to us sufficiently thorough in finish for a style of subject which is nothing if not brilliantly handled. Flower subjects proper are well represented by several works, especially "Chrysanthemums" (343), by Miss Catherine Stocks; and the "Pansies" (548) of Miss Grace Hastie. Among architectural subjects we may mention Mr. Marshall's "Whitehall" (28), where, however, the two towers of the Houses of Parliament seem too close up to the end of the street, or too large for the scale of the scene; Mr. Macquoid's effective drawing of "Old Shops, Brittany" (47), Mr. Spiers's drawing of "St. John's College, Oxford" (165), and "A Sunlight Effect in St. Mark's" (245), by Mr. N. Walsh.

THE ADAPTATIONS OF ART.

TWENTY-EIGHT years ago a Commission was appointed in Paris to examine a portrait in enamel, which was declared to be historic, and therefore genuine, of Madame de Maintenon. It resulted in a controversy which, so far from settling the question, opened up a far wider one, continued to this day,—whether three-fourths of the images extant, in sculpture or painting, of celebrated personages are authentic, personal likenesses or not, or whether they are no more than crude ideals. At last, after more than a quarter of a century of contemplation, the Academy has delivered its verdict, mixed up, however, with so many varying opinions, that no approach to a distinct authority can be said to have been arrived at, even with respect, for example, to the figure and countenance of Madame de Maintenon;—so far, at any rate, as the monuments and medals confirm or disavow the accepted views. Still, in the name and interest of even historic art, we must be satisfied with some ideals in this matter. The Greeks imagined Homer, as they imagined Hippocrates, according to fancies wrought out from their poems and their practice; but this was simply linking one form of poetry to another. In after days we know what the conquering despots did: they hewed off the marble heads of goddesses and heroes, and clamped them upon mutilated torsos, without the faintest vision of archæological knowledge, and this process of alternate mutilation and restoration went on through ages. After, then, more than a quarter of a century of investigation, it is interesting to review the results, just now circulated, albeit in but a partial form, of the Commission. Firstly, with respect to portraits. The list, as we have noted, is led off by Madame de Maintenon, clad in a mantle of royal blue velvet, surcharged with ermine, and this, it is affirmed, is simply a copy of the picture, idealised by Ficquet, of the celebrated penitent Saint Francise Hyacinthe. M. Rigaud denies it; but he adds, with a candour doing him credit,—"There is infinite incertitude in the matter of portraits." Certainly, he is, and always has been, in the right, while connoisseurs and buyers have, in an equal degree, been grievously deceived. Not a few examples are cited. In the gallery of the Louvre, the portrait of Baccio Bandinelli, long described in the official catalogue as having been painted by himself, was ultimately discovered to have been that of a sculptor, Baccio de Monte Lapo. Then, much has been heard concerning the celebrated canvas, "Titian and his Mistress," also at the Louvre, which the new generation of critics affirm represents neither the one nor the other: an opinion first set in vogue by Ticozzi, who sought to demonstrate that the male face was that of Alphonso I., second Duke of Ferrara, and the female one that of Laura de' Dianta, once his mistress, and afterwards his wife. However, faith in these matters is not necessarily more deeply duped than incredulity, and we are only tracing just now the outlines of a fresh critical theory. Again and again, no doubt, have the same portraits been painted, with different names underwritten, and thus are they bargained for in studios, and thus are they bartered in the market, and thus are they secured by connoisseurs, until they get hanging-places in other than provincial galleries. Thus, again, the lineaments of Aretino, as presented on the canvas at the Louvre, are challenged as contradicting every characteristic of his face, illustrated as it is by contemporary medals. It might be easy to pass through a long gallery of these pseudo-graphic representations; but it may suffice to point out, among the artistically-condemned, the portrait of Charles VIII., by Leonardo da Vinci; that of the Second Charles of Amboise; and that more celebrated than either of "La Belle Ferronnière," attributed, after the death of this too-notorious beauty, to an easel which must have lain long blank before the world before he (Leonardo) could, by any chance, have thus illuminated it. Leonardo finished no pictures between the years 1516 and 1519, during which interval his favourite, in the half-bloom of her enchantments, died; so that she must have been painted in her coffin, if at all. In fact, during that period, if the contemporary records may be trusted, what leisure that versatile artist had to spare, was devoted to projects of military ramparts, dykes, and canalisation, rather than to portraitures inspired by affection or loveliness; because, indeed, he was "Engineer-in-General" to Cæsar Borgia. Does not this sweep clear an entire wallful of ancestral effigies? In a similar iconoclastic vein, in the report, soon to be issued in a more regular shape, the accredited and accepted portraits of Raffaelle are brought under review, and the question is daringly put, has one of them proved its title of authenticity? Is not one, at all events, that of Bindo Aldoviti, the treacherous young Florentine peer; and another, that of the infamous Urbinese Duke; and a third, either that of the Duchess of Mantua, or of Lucrezia Crevelli? It disturbs our ideas to have these problems suggested, after Middle Age and modern art have had their histories written, in the second half of the nineteenth century. The official critics seem, however, to be making gratuitous havoc among reputed originals, even though these should appeal to "the School of Athens" in their favour; for, amid the blows dealt against sixteenth-century canvasses, a violent championship arises for "the false Adonis" and the "surreptitious Clio." Surely it is enough to deny a portrait of Christopher Columbus, without complaining that we

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have not one of Alexander the Great,—the latter copied, always from the Walhalla of Greece; the former from the chronicles of Salamanca, "with his long face, pointed nose, and blue eyes, intent upon a discovery." According to a French authority, there exists of this man not a solitary graphic account, or sketch, or outline, of his countenance, or even so much as a suggestion of his costume. It may be, and probably is, true, that there is a slight amount of dogmatism and disdain in all this; yet it may deter young artists from supposing that they have the originals, when they have no more than the lay-figures before them. The artistic commissioners went even beyond this, asserting that we have preserved to us nothing like the features of Vasco di Gama, of Jean de Castro, or even of Van Eyck, notwithstanding that several volumes of biographical and anecdotical narrative associate themselves with each of these names. We might as well search, we are assured, for the photographs—though this is not the term employed—of Gargantua, Pantagruel, and Panurge, though here the Commissioners fall beneath the dignity of their subject, and seem to be no longer studying amid the true relics and the ingenious imitations of Ancient and Renaissance Art. It is slightly refreshing to pass from this atmosphere of mockery to that which, if not more serious, is nevertheless only satirical, concerning the tinted miniatures, wholly worthless from the historical point of view,—that of Madame de Sévigné, celebrated by a sonnet of Menage, the enamelled flatteries of Petitot, and the "daintily-executed epigrams on ivory" of Nanteuil, an artist almost forgotten, yet a bright one nevertheless, but whose portraitures, of whomsoever they might be painted, were, as that flippant old Parisian critic declared, forgeries upon nature. We have four portraits of Molière, not one of which resembles the others; yet this is not more perplexing than the literary and political libels, or, on the other hand, the personal and social flatteries, or caricatures, which have been perpetrated, through all ages, in the shapes of painting and sculpture. Below these lie a number of deliberate falsifications,—as of the First Napoleon, distorted by a court artist into an image of Louis XVIII.; and the headless First Charles of England, decapitated, transfigured, by a new bust, into the likeness of Oliver Cromwell. If we want more instances, we have only to look beneath that mighty monument of death, the Abbaye of St. Denis. There stands, niched in a thick Gothic wall, the bust of Maria Lecquinska; but she who actually sat for it was the wife of the sculptor, Jean-Guillaume Moitte, and even of him an entire image could only be patched up from the fragments of at least a century. Here is an archæological investigation towards which our French Commission leads the way, and which may, in the end, confound both some old and some new ideas.

GIOTTO'S "GOSPEL OF LABOUR."

MR. SIDNEY COLVIN, M.A., the Slade Professor of Fine Art at Cambridge, delivered an interesting lecture on Thursday evening, the 25th ult., at the London Institution, Finsbury-circus, on Giotto's "Gospel of Labour."

Professor Colvin commenced by saying he had come before them to show an interesting series of Florentine sculptures which were executed in the first half of the fourteenth century at Florence. Their workmanship was very simple, almost rude; they consisted of twenty-six panels in marble, carved in relief with subjects chosen to represent men's life and men's industries upon earth. The particular point that made them the most interesting in the whole history of art was that they exhibited in a kind of epitome the whole essence of civilisation, the whole genius of a great people at the greatest time of their history. He called this series Giotto's "Gospel of Labour," because they set forth for the first time in the history of art those arts and industries upon which the power and the fame of the great cities of modern Europe rested. The Italian cities—and Florence first—were the nurses of modern civilisation, of modern commercial industries—the origin, in fact, of all those energies, whether of good or evil, that made the world what it now was. This rude, early, and simple series of sculpture he had chosen to illustrate the whole soul of Italy in the thirteenth century.

He was not going to trouble them with complicated matters of history, but for the purpose of his lecture it was necessary to point out the two great aspects of the thirteenth century in Italy. First of all, the beginning of the thirteenth century showed the whole mind of Europe, especially Italy, to be in a state of anarchy and change. New centres of commerce were beginning to grow up, and the urban populations were beginning to get crowded and uncomfortable, but at the same time intelligent. The church scarcely touched these populations. Owing to their abject misery and neglect, they became hot-beds and centres of rebellion. The years 1200 to 1220 threatened great religious changes, revolution, and reform; but there then arose certain influences which arrested the course of things. The greatest influence was that of St. Francis of Assisi, who was truly an "apostle of men," he being born with an overwhelming love of his fellow-creatures. He firmly grasped the doctrines of the Roman Catholic Church, and owing to the spirit of himself and his agents, there were gathered into the fold of the Catholic Church all those populations that were beginning to grow restive, and show signs of rebellion. For good or evil, this change was brought about by St. Dominic, of Spain, and St. Francis, of Italy. All the public and the collective life of the cities was dedicated and consecrated to the church. The second great aspect was the political one. There had always been all over Europe a certain number of industrial people who escaped the domination of the feudal powers; but it was not till the thirteenth century that the trading and manufacturing communities of Italy asserted their independence and established a republic life of their own, and made themselves free from, and independent of the princes, dukes, and other various orders of feudal hierarchy who asserted their supremacy over them. The aspect of political life was then a complicated one. The first of the questions was, whether the trading and artisan classes should or should not have the government of the cities in their hands; and the gradual efforts by which these classes succeeded in dispossessing the feudal magistrates of their power was one great part of these civil struggles, of which Italy was full. Another important struggle was that between the Guelphs and the Ghibellines—the spiritual and the temporal power,—the Pope and the German Emperor. These two powers could not co-exist in peace. Ultimately the imperial power was overthrown, and the Pope became the champion of all civil and religious liberties, Florence being the great centre where this great change was worked out with the most successful issue, the city where the real Republican Government was founded upon an essentially-popular and industrial basis. In the year 1250 the first rising of the people took place, and ten years afterwards the famous fight was fought out.

The new organisation rested upon trade arts or guilds upon which the whole civilisation depended. These Florentine arts or guilds had the whole government of the town in their hands, and comprised the following: — (1) Notaries, judges, and lawyers; (2) merchants; (3) wool-staplers; (4) money-changers, including bankers and dealers in finance; (5) apothecaries, including all kinds of druggists and doctors; (6) silk-weavers; and (7) tanners and hide-merchants. Then came five lesser arts—clothiers and haberdashers, butchers, bootmakers, and masters in stone and wood. Under the latter modest title all painters and artists—all men who had made Florence illustrious—were included; and as they never constituted themselves into a separate guild, their professional status was that of "masters in stone or wood." The last of the five lesser arts was that of smiths and ironfounders, including all goldsmiths and workers in fine metal. These arts or guilds became the real source and centre of government.

As might be thought, this was a prosaic time, but there were signs of greatness in the freedom of the prople; they succeeded in uniting business-like management to their commercial affairs. These practical men were the most imaginative. With the eagerness of their new life, they were not found quite so forward, historically, in raising public monuments, or in beautifying and adorning their churches like some of their neighbouring cities; but when they did begin, the work grew under their hands. The church, which became to be the expression of all they loved and cherished, was the Cathedral of Florence, the church of the obscure local Saint Reparata, as it was first called; or, as after the Franciscan preaching up of the Virgin, it began to be named, that of St. Mary of the Flower, or of the Lily. The Florentines bestowed the whole of their energies in endeavouring to make this church a monument worthy of the city. From the first it was regarded as an embodiment of the dignity of the city. This was expressly stated in an extant grant to its first architect, Arnolfo, of freedom from all public burdens. In 1334, Giotto succeeded Arnolfo, and after having completed the façade of the building, he designed the campanile, or bell-tower, which was his title to glory as an architect. The base of the campanile was ornamented by this very interesting and remarkable series of sculptures; and it was after Giotto's drawings that they were subsequently chiselled by Andrea Pisano. Of the twenty-six panels, there was reason to believe that the last five or six were done more than 100 years later by Luca Della Robbia. Visitors to the cathedral, for the most part, had not probably noticed these beautiful sculptures, for they were placed at the base of the bell-tower. By these sculptures Giotto set himself to dignify and ennoble all sorts of honest toil, and the trades of all the seven greater and five lesser guilds, in the ornamentation of the building. In them was expressed the whole essence of the time in which he lived. They were fairly comparable in all essentials with the finest works of Greek art, while they were marked with special beauties of their own,—simplicity, directness, and perfect justness. All works of history at that time began, as a matter of course, at the beginning of things. In these sculptures, too, the series commenced with the creation of man, but they showed a variation upon the conventional treatment. Instead of following with representations of the temptation and the fall after the creation, they were shown Adam with a large spade, and Eve with a big distaff, so bringing them back to the time

"When Adam delved and Eve span."

Then it immediately occurred to the beholder that the sculptures were intended to represent the history of human industry, following upon the expulsion of their first parents from Eden. The next in order was the gentle shepherd's craft, represented by the patriarch Jabal, "the father of such as dwell in tents, and of such as have cattle." He was depicted as sitting under canvas, with his flock and sheep-dog round him. The key-note which was struck in the Book of Genesis was acted upon throughout the series, and the various arts and industries had their representations in aged patriarchal figures. The next representation was Jubal, "the father of all such as handle the harp and organ," represented as blowing through some shapeless instrument which he had succeeded in making, the drapery being extremely well executed. Next followed Tubal Cain, "an instructor of every artificer in brass and iron," who, as a blacksmith, was represented with bellows, anvil, pincers, and hammer. The cultivation of the vine, so important an industry in Italy, was said to have been symbolised by the patriarch Noah. Then came one of the seven liberal arts, astronomy; the stargazer was looking skywards, and his globe and zodiac were to be observed, this panel being the best preserved of the whole series. Building followed, the master builder (probably the patriarch Enoch, who "builded a city," although some had thought it might be Giotto himself), with thoughtful brow, directing the masons in their work. Pottery came next, women being represented as bringing cakes of clay for the potters; which was followed by a marvellously truthful representation of the art of horsemanship, the spirited horse and the daring rider who first tamed him being rendered with equal mastery, both of thought and chisel.

Weaving, in Florence a female art, as when Athene was its goddess, was depicted as being done by a woman working at the loom, while another woman looked on. Law came next,—God the Father being sculptured as its source, from whom the legislator received both codes, the civil and ecclesiastical. Dædalus, or some man flying, followed, the realism of the feathered body and of the hands inside the wings being unmistakable.

The panel representing the first boatmen on their experimental row, with dread and resolve alike on their faces, venturing forth on unknown seas, prophesied the navies of the world, the sailor's worth in the commonwealth being honestly recognised. Next came the art of war, which showed a slain man, the slayer standing with the expression of Cain in his countenance. After ploughing came the first charioteer, who had knocked a rude cart together

n the most practical manner. Then followed allegories of the arts, painting, sculpture, grammar, logic, rhetoric, and geometry (supposed to have been embodied in Euclid). Music, for the second time, was symbolised by Orpheus playing with his lute to birds and beasts. Arithmetic was represented by two patriarchs counting on their fingers; and the goldsmith's art, symbolised with the small anvil and hammer, closed the series. Further than this the Slade Professor was not disposed to trace Giotto's own.

With but few exceptions photographs of the panels were shown on a magnified scale by means of the camera and lime light, and considerably added to the interest of the lecture.

REVIVALISM OR PROGRESS?

To the intelligent mind nothing in the world appears to be the result of accident. The result may not seem to have arisen from known causes, but the causes exist, however deeply hidden; the influence may not be obvious, but it is felt to exist.

At different times the genius of architecture pointed in different directions, and her votaries obediently followed the course indicated. The road lay through varied scenes, each bearing the marks of particular modes of human culture: the massive and archaic, refined and highly cultivated, rank and luxuriant, checked and undefined, aspiring and spiritual, aspects, were each in turn passed in review; but the guide and monitor departed, and then all was confusion and disorder. Progress there was, till the desire to return became irresistible; looking backwards for a guide, there appeared a pillar of salt. Calmness and deliberation disappeared, and each strove to reach the goal of excellence by the shortest possible route. A short cut was sought which might spare weary days of travel along the highway; but these short cuts invariably led to failure; the pathway is found to be strewn with decayed branches, the bridges broken down, bogs and quagmires are formed: disappointment is the result, and the traveller returns to where he started from, bearing only the traces of his wanderings upon travel-stained garments. Yet such wanderings are not altogether barren of result; some knowledge is gained thereby, the extent and nature of the disused pathway is made known, a chapter added to the history of the district.

It is something that a particular phase of architecture has been assigned to the period when the Stuart dynasty reigned in the United Kingdom. But why should we all be harping on the same chord? Jacobite minstrelsy may be well enough occasionally, as a *pièce de résistance*; but it becomes intolerable when presented as the staple of daily fare.

There is no surer test of the ratio of intelligence as regards art than the dwellings of the people. When a public building of some importance is required, the architect may be unfettered by external interference, and have an opportunity of giving full play to his creative faculty, and may produce a work of great excellence, but this is no criterion of the taste of the general public. The few eminent men who have produced worthy works doubtless exercise a great influence upon their fellows, who have neither the opportunity nor ability to think out and design such, but it falls in the way of every practical architect to design domestic buildings of some sort. The demand for art in the dwellings of the middle classes which has arisen of late opens a wide field, and it might reasonably have been expected that a new path would have been struck out.

But this is an age of revivals: one party sets out on pilgrimages to the shrines of Mediæval saints; another assumes the discarded vestments and manners of their ancestors; while another, in the more sober garb of Puritanism, protests anew against these things; and all this time a few earnest workers are diligently employed in the field of scientific research, bringing new matter to the surface, and adding new products to the stock of mankind.

The anomalies of our social condition are striking: the modern pilgrims form a strange contrast to the pilgrims of old; there is little romance or picturesqueness as they crowd into the railway station and are swiftly conveyed to the shrine. The use of tapers and incense, sanctioned by churchwardens, is a most glaring anachronism. The divine right of kings or popes has long ago been sufficiently protested against. Let us attend to the wants of the living. The spiritual and material wants of man are more closely allied than seems to be generally understood. Where the one is low, so is the other. As regards spiritual wants, architects, as such, have no *locus standi*, but their work has much to do with the great problem of the improvement of social life. It may be pleasant and safe to fraternise with the pilgrims, and ritualists, and evangelicals, but the more manly and noble part would be to join issue with the natural philosophers, and apply scientific discoveries to the promotion of the material wants of the people, to the rehabilitation of all in a healthy and comfortable condition.

Neither spiritual nor other wants, we opine, are promoted by the exhibition of the bones of saints, the display of ecclesiastical millinery, or the weak application of far-fetched anecdotes and providential acts.

"Exact imitation is not necessary to reverence." The true priest is he who interprets the unchangeable laws of God. One of the plainest of these is the law of progress. Revivalism is but a step backwards. The thing revived never enjoys robust health. It was once nearly extinct, and will by and by be quite dead. The galvanic shock produces no permanent result, only a dreamy sentimental listlessness, with, it may be, the hectic flush of apparent health. "Life is real, life is earnest"; it is best spent in practical usefulness, not in sentimental uplifting of the hands and upturning of the eyes. Not in the reproduction of æsthetic forms which have long lain asleep in the lumber-room, but in the formation of substantial realities fitted for daily use, not necessarily devoid of beauty, but possessing a beauty which is not merely surface deep.

There are "whited sepulchres" in our cities "full of dead men's bones," nay! not even whited,—both without and within they are corrupt and filthy. Social wretchedness and misery cannot be in harmony with spiritual purity and goodness. The germ of disease which floats over the stagnant cesspools of our cities infects both soul and body. Let us not prate of civilisation when such exist. Leave revivalism to the weak and sentimental. Let the strong men devote their energies to the solution of the complicated problem of affording to every man a healthy attractive home, whence he can go forth to labour invigorated by sound repose, and to which he will return with joy, and in which we may reasonably expect to hear the voice of thanksgiving. Then will new prospects be opened up where each may add his quota to the beautifying of the scene and enjoy the fresh air and sunshine which God has provided for all his creatures.

FLOATING SWIMMING-BATHS.

ONE of the chief wants of all provincial towns situated upon rivers of any size or importance are public floating swimming-baths. The ordinary public baths which are to be found in most towns are quite inadequate for the wants of the population. In some towns the absence of a river makes it necessary that the ordinary swimming-baths should satisfy as best they can the wants of the citizens. But wherever there is a river, there should be abundant accommodation for every class of the population. Every one nowadays recognises the use of swimming as a healthy and invigorating amusement, and as a necessary prevention against many lamentable accidents. But little or nothing is done, even in these days of sanitary reform, to utilise the means at hand by floating swimming-baths. But within the last year the town of Chester has set a very good example in this respect. A company has been formed under the auspices of the most influential inhabitants of the town, and a bath has been built which next summer will be placed in the River Dee for public use. But when this subject comes to be carefully considered, we are inclined to think that the proper body in a town to maintain and to build these baths is the Corporation; for they are essentially valuable in regard to the public health and pleasure. But corporations are not over-anxious to inaugurate improvements, and therefore certainly the next best plan is that they should be established by private companies. But the drawback in regard to companies is that shareholders must be paid a dividend, and the larger that dividend is the better they will be pleased. But in order to attain this end it is obvious that higher prices must be charged for admission than if the cost of the maintenance of the bath alone had to be provided for from the receipts. And it is most important that these baths should not be looked upon as a mere luxury for gentlemen, but should be accessible by all classes of the community.

No one on a summer evening can go upon any of the rivers in England near a town without being struck by the sight of the men and boys who are to be seen furtively bathing from the banks. It is quite certain that with better opportunities the numbers of those who wish to bathe and swim would be doubled and trebled. Therefore it is that it is very much to be wished that corporations should take this matter in hand.

But in the making of floating swimming-baths there is likely to be seen a too elaborate and expensive mode of construction. Any one who has sojourned for a time on the Seine or the Rhine, or any of the other rivers of France and Germany, must remember well the rude floating baths which are to be seen near every town. It would be well to bear this in mind: that an elaborate and costly construction must limit their number, and, consequently, on account of the higher charges which are necessary, the number of those who frequent them. Sufficiently pure water, seclusion, and shelter whilst dressing and undressing, and an absence of danger for the swimmer, are the three main desiderata in the construction of swimming-baths. To attempt more than this is to forget the object of these baths, viz., the utilising and improving of the natural bath,—the river. The floating bath must rather be considered as supplementary than substitutionary, which is what the ordinary brick or stone baths of our towns are. There seems to us to be a more useful field open for these baths in the provincial towns than in the metropolis, where they can only be a very inadequate substitute for the miles of river necessary to accommodate a population like that of London. We hope that the establishment of the bath in the river Dee, at Chester, is only the forerunner of numerous others in all the rivers in England. The Thames, the Severn, the Avon, and the Trent should not be left behind by the Dee. The experiment,—for experiment it is,—at Chester, will be watched with marked interest, and it is to be hoped that those who are likely to be employed professionally in the construction and supervision of future baths will employ their ingenuity in endeavouring to make their construction as cheap and as durable as possible. There can be nothing to which the athletic ardour of our day can be more usefully directed than the establishment of floating swimming-baths, or in which the constructive abilities of professional men may be more usefully employed.

SURVEYORS' CHARGES UNDER THE ECCLESIASTICAL DILAPIDATIONS ACTS.

WE alluded briefly in our last to the report which has been published by the Ecclesiastical Surveyors' Association,* on the proceedings of the Committee of the House of Commons on the Ecclesiastical Dilapidations Acts. We take the following from the conclusion of it:—

"A vast amount of time was spent in the House of Commons Committee upon the expenses of the Act, upon which extravagantly erroneous statements had been circulated, made on the authority of a dignitary at a meeting at Shrewsbury in the autumn of 1875. According to this authority the fees payable to the officers of a single diocese for five years would amount to 33,165*l.* The return printed in the appendix shows that on 3,011 cases the surveyors' charges amount to 19,922*l.* 17*s.*, which is just about 6½ guineas in each case. Some 830 more, on which there is no return, would at the same rate bring the total up to 25,482*l.*, being for four years and seven months considerably less for the whole kingdom than the erroneous estimate for a single diocese. This sum for four years and seven months is very nearly equal to the proportion allowed for surveyors for each year in the estimate submitted to the House of Commons by the chairman in moving the appointment of the Select Committee on the 21st of March, 1876. The like estimate was given in evidence by the treasurer of Queen Anne's Bounty. It assumes a compulsory recurrence in every benefice of the survey every five years, which forms no part of the Act of 1871, and the average of fees is arrived at on only sixty cases

* At 56, Hatton-garden.

of loans admitted to be heavy and of unusual character. The actual valuation of dilapidation works in the same period on 3,313 benefices is 470,585*l.*, being almost 139*l.* per benefice; on 530 orders there is no return, and many of them could not have had the valuation made up on the 1st of March, when the order had issued only a few days, or even some weeks before; but assuming all made up, on this average we must add 73,670*l.*, making a total of 544,355*l.*, the professional charge on it being 4*l.* 14*s.* per cent. Thus throughout the kingdom the whole business of every case has been accomplished for two clergymen at less than 5 per cent. formerly charged for one, and still charged in civil dilapidations, 5*l.* 6*s.* per cent. being at least saved, and for this much reduced charge a greatly increased labour, including the providing of specifications and the supervision of works, and granting certificates is given. For these additional labours in civil cases the invariable charge is at least an independent 5 per cent. and expenses, so that the ecclesiastical cases now get for less than 5 per cent. what in civil cases, and under the old ecclesiastical state, cost 15 per cent.

The Act of 1871 has effectually extinguished a claim sometimes formerly raised against outgoing incumbents, viz., the charge for 'progressive decay.' The excuse for making this charge can nowhere be found in the old law or old cases; the case of Wise *v.* Metcalf lends no countenance to it; yet where work was old an excuse was found for claiming a contribution towards its reinstatement when it might become worn out, thus turning a claim for dilapidations from its legitimate objects, past neglect, into a claim for insurance against what might occur in the future. It may safely be said that no such claim ever went into court in a bill of particulars. Now, when the statute of 1871, in sections 15 and 31, required every claim to be stated in a formal bill of particulars, and strictly adhering to the principle of the old law, required those particulars to be 'the works needed' (not works that might at a future time be needed), it closed the door against this unlawful charge. Insurance against future repair is of course in itself good, but it never was lawful to charge it against a past possessor; the new incumbent may very wisely give his attention to it, and bear some present expense for its sake, and thus it often becomes wise for him to do more repair, in order to free himself for the future, than it is lawful to charge upon his predecessor.

Great good has been widely produced by the Act of 1871, although nowhere noticed in the evidence, where incumbents have bestirred themselves to effect repairs, neither asking loans nor narrowly calculating the exact requirements of the law, but doing their best to uphold the property committed to them. It cannot be doubted that a great deal has thus been accomplished indirectly by the Act."

AN ARTIST'S SALE IN PARIS.

Probably no collection of pictures has ever attracted so many sight-seers, or brought together so large a number of art-lovers, as have, within the last week, visited the Hôtel Druot, in order to see the 300 pictures and sketches by the late painter Diaz.

Two of the largest rooms of the hôtel have been thrown open, and the walls completely covered with the works of the charming painter Narcisse Diaz, and a *queue* (the art, or quasi-art, of standing "in tail," being, as Carlyle says, the characteristic of Parisians, distinguishing them from all others) slowly edged itself round the rooms in delighted admiration at the sight of the accumulated treasures.

What perfect realisations of the familiar forest of Fontainebleau scenery, of which neither Diaz nor the public ever seem to tire! What bright little recollections of Moorish life, reminding one slightly of Müller's beautiful work, as Diaz's sunsets occasionally suggest the work of Turner, and showing us that in every stage of his work what he did was completely finished!

To the artist, the sketches and commencements of pictures shown in this collection are as valuable as those unfinished works of Meissonier, exhibited a few years since in London by Mr. Wallace; for in the beginnings of both painters are distinctly and clearly shown that immediately the panel is touched by the painter the work is finished; and if the tyro collectors of works of art did but know how little actual labour they get for their money, they might sometimes begrudge their idle investments.

No one unacquainted with the many private collections of art-treasures in Paris, can form a correct idea of the art of that country; neither the Louvre nor the Luxembourg possesses the choicest works of French artists, with the exception of two or three notable examples of pictures too large for private collections, and we should form a very erroneous idea of the merits of Corot, of Rousseau, of Millet, that great painter of what Charles Kingsley calls "democratic art," the revelation of poetry which lies in common things, if we looked no further.

In addition to the three hundred pictures by his own hand, Diaz has collected, with the most affectionate care, a perfect little series of the works of his contemporaries.

It is wonderful how painters and literary men contrive to find the time to get together so many treasures. M. Diaz appears to have indulged in the collector's passion with a rare discretion, and day by day for the last week the Hôtel Druot has been dispersing his collection, the result of which will endear his name to the establishment, and add a substantial embankment for the *expert's* decisive services.

Reynolds and Lawrence collected little beyond specimens of fine "old masters," many interesting old drawings by Italian and Dutch painters, and folios of splendid impressions of old engravings; but Diaz has left to us few of such treasures, one beautiful little Correggio, two or three genuine pen-and-ink sketches by Rembrandt, as many Italian drawings, and a head of a girl in coloured chalks by Reynolds, a little doubtful (it fetched nearly 130*l.*), but very beautiful.

But if Diaz has left but few old masters, how wisely and how well did he surround himself with choice and beautiful things; what charming pictures and drawings, by Theodore Rousseau; what a perfect little peasant by Millet; what bright harmonies of colour by Delacroix and Decamps; and, above all, what precious studies by Barye, with groups of living bronze by the same masterly delineator of animal life!

Hanging above all these treasures, in sober brilliancy, are suspended exquisite specimens of the tapestry art of the fifteenth and sixteenth centuries, gems of Persian carpets, sunned and faded into the colour of butterfly or moth's wings, forming backgrounds to Persian and Arabic vessels in metal and china; some three or four hundred ounces of real Louis Treize and Louis Quatorze silver; a few specimens of Italian weapons; some well-selected and well-bound tall copies of books in dwarf ebony-edged bookcases; some rare bronze and silver medals of the fifteenth century; a few old engravings; a whole suite of Louis XIV. furniture; and just enough old china to give pleasure, without exciting the envy of his collector friends; every object precisely in the condition to command the respect of the most exacting amateur, and in sufficient quantity to ornament just such a house as any reasonable being would desire to occupy.

Whether the man is most to be felicitated who owns a Turner, a Constable, a Müller, a Leighton, a Millais, a Hunt, a Walker, and a Mason, or he who hangs on his walls a Rousseau, a Corot, a Diaz, a Delacroix, a Cabanel, or a Millet, is a question very difficult to determine; but he who owns a veritable Sir Joshua can only be successfully rivalled by the happy possessor of a Gainsborough, and no French painter approaches either of those great masters.

The sale, which terminated on the 27th of January, has realised about 20,000*l.*; the pictures individually have not reached the enormous sums that we in London are accustomed to hear quoted; but in Paris, the collector does not buy to sell again, and he feels, however well off he may be, that 300*l.* or 400*l.* laid out in a picture is a large sum, and the wide circle of art-collectors here like more to pick up a treasure value from 10*l.* to 50*l.* Those are the happy collectors, and it is they who know how to get pleasure and credit out of their possessions without looking too narrowly for the profit.

Maidstone Improvements. — The Local Board have resolved to carry out a complete system of drainage, at an estimated cost of 30,000*l.*; and to construct a new bridge across the river Medway, at Maidstone, at an estimated cost of 32,000*l.* Mr. Lewis Angell is the engineer for the former work, and Sir Joseph Bazalgette for the latter scheme. The bridge project was, on the 24th ult., unanimously approved of at a large meeting of the ratepayers, after a detailed explanation by Sir J. Bazalgette.

THE TEMPLE OF DIANA AT EPHESUS.

In the discussion which followed the reading of Mr. Fergusson's paper* at the Royal Institute of British Architects,

Mr. J. T. Wood said that on a previous occasion he had pointed out the data upon which he had made his plan; he, however, went over them again, because the criticisms which had been put forth by several reviewers of his book were based on very grievous errors, which a more careful study of the plan would have rendered impossible. The position of the columns at both ends of the temple was certain; so, also, was that of the columns at the sides. There was equal certainty as to the width of the cella, 69 ft. 7½ in. In fixing the position of the central columns he was partly guided by finding portions of their foundations *in situ*. Proceeding to discuss Mr. Fergusson's remarks categorically, Mr. Wood remarked that as to the height of the columns, which he had concluded was 55 ft. 8½ in., it was true he had not been able to find sufficient fragments of any one column to enable him to arrive with certainty at its height, but the height mentioned was that given by Vitruvius, who described the improved Ionic order as being eight diameters and a half independently of the base. He (Mr. Wood) did not believe that the columns could possibly have been 60 ft. in height, and especially not 60 Greek feet. Mr. Fergusson had spoken of the walls of the cella as being 3 ft. in thickness, but he (Mr. Wood) in his exploration of the remains, did not see anything to induce him to believe that such thick walls ever existed. He found certain masonry piers, but these he believed to have been portions of a church the erection of which had been commenced, the uncompleted building being afterwards thrown down by an earthquake. On some piers he met with traces of the cella wall, and these enabled him to determine the position of the pronaos. Mr. Fergusson's 3 ft. walls were mere expedients for making his plan symmetrical, but they were incompatible with the correct plan of the temple. The question raised by Mr. Fergusson as to the *columnæ cælatæ* was very important, and it would be well worth the while of a deputation of members of the Institute to visit the British Museum, and, after examining the remains, to consider whether it was possible that what he (Mr. Wood) said was the frieze of the temple could be anything else but the frieze. Mr. Fergusson had suggested that the fragments in question were portions of the pedestals which supported the columns, but the supposition was wholly untenable. He (Mr. Wood) was perfectly well aware of the marks referred to by Mr. Fergusson as existing on the upper surfaces, and he concluded that those marks had nothing whatever to do with the structure of the building under discussion, but that they existed when the temple was erected, the blocks having, in all probability, formed portions of an older temple, being worked up and re-used for totally different positions in the subsequent structure. He was supported in this conjecture by the fact that the marble of these blocks was finer in quality than that used in the remainder of the building, and corresponded with that used in a previous temple. Notwithstanding all that had been said by Mr. Fergusson, he (Mr. Wood) still adhered to the views which he had put forward in his book as to the plan and arrangement of the temple.

Mr. Watkiss Lloyd said that in studying the arrangement of the temple he had only had the materials furnished by Mr. Wood's book to go upon, and he confessed that he should have liked more materials than he had, although no doubt Mr. Wood had got as much as the site would afford. What had been obtained, however, was capable of being more clearly set forth. The discovery of the temple was much to Mr. Wood's honour; but, interesting as was his book, it was certainly wanting in some of those details which, although not necessary in a work addressed to the public at large, would be highly interesting to architects. For instance, it was desirable to have a section of the basement, as far as Mr. Wood had obtained it, with levels, because, on the great characteristic feature of the temple,—the base,—everything depended. He found it very difficult indeed to conceive that the columns could have stood on a stylobate with so great a breadth of projection in front, and with so great a depth of steps below it; such might have been the case, but one would have liked to be

* See *Builder*, p. 61, *ante*.

able to see exactly the data from which the level of the upper platform had been deduced by Mr. Wood. Another feature of the temple was the unequal spacing of the columns in front; this, to a certain extent, must have been the case, because no doubt the columns in front ranged with the cella walls, and there could only have been two more columns between them and the steps, however they might have been arranged. In studying the plan of the temple by the aid of Mr. Wood's book he was not aware that the columnar spacing was conjectural on the part of Mr. Wood, and he had devoted considerable pains to discover what principle underlay it, but, of course, without success. In concluding his remarks, Mr. Watkiss Lloyd urged Mr. Wood to do justice to himself by giving to the architectural world and the student world the net results of his discovery and examination of the temple, in the form of elevations, sections, plans, &c., of what he had found. These would not add to the interest of the book in the eyes of the general reader, but it would greatly enhance its value to those who made such subjects their especial study.

Mr. Wyatt Papworth said that Mr. Fergusson, in referring to the subject of the hypæthron, had stated that from the time he brought the subject before the Institute in 1861 down to the present paper the subject had remained unnoticed. On that point Mr. Fergusson was mistaken, for in 1866 his (Mr. Papworth's) brother read a paper before the Institute on the subject of hypæthral temples, and in explanation of the manner in which he conceived that the temples might have been lighted he brought forward two theories founded upon certain marbles which had been discovered and ultimately engraved in Professor Cockerell's work on "Ægina and Bassæ." There were two methods of lighting treated of in the paper, one of them being the very hypæthron which Mr. Fergusson had now brought forward, and which was reproduced from two sarcophagi, one from Crete and the other from Delos. There was rather an elaborate plate given in the "Transactions" of the Institute, showing the manner in which Mr. Papworth supposed the temples to have been lighted. The other mode of lighting referred to was by means of slabs of marble with holes cut in them, and capable of being covered by means of shutters during the prevalence of bad weather. As to the mode which Mr. Fergusson had suggested for the roofing of the Temple of Venus at Rome, it was one to which he (Mr. Papworth), as an architect, would scarcely like to put his name.

Mr. C. T. Newton (Keeper of the Greek and Roman Antiquities at the British Museum) said that he visited Ephesus seven or eight times during the time Mr. Wood was there, and believed he was one of the few moderns who had ever seen the floor of the temple free from water; since Mr. Wood had dug it out it was generally covered with 5 ft. of water. On that occasion Mr. Wood was kind enough to show him the lines of the cella walls, and a portion of one of the walls in position. He confessed that he was at first very much disposed to adopt Mr. Wood's view that the sculptured blocks at the Museum, before referred to, had originally been fragments of the temple burnt by Erostratus, converted into portions of the frieze in the later temple, but on further consideration of the subject he had arrived at pretty much the same conclusions as those put forward by Mr. Fergusson, whose views were corroborated to a great extent by an experiment which he (Mr. Newton) had made with the view of ascertaining whether the drip-mark corresponded with the mark on the upper surface of the stone. He heartily seconded the practical suggestion made by Mr. Wood, that the members of the Institute should visit the British Museum for the purpose of seeing the fragments of the temple for themselves, and it would give him (Mr. Newton) very great pleasure to receive them and conduct them through the marble collections. It would be desirable, however, that the members should fix upon a day for the visit, and then give him a few days' notice, for the marbles were so scattered about in different parts of the building, and in sheds, that he should be unable, without having a few days' prior intimation, to make arrangements for them to see all that was most notable in the collections.

Mr. R. P. Pullan, in proposing a vote of thanks to Mr. Fergusson for his paper, said the theory of restoration propounded by the lecturer was most ingenious, and did not materially differ, in its main features, from that put forward by Mr. Wood. When the members of the Institute visited the Museum to see the fragments they would be able to speak more definitely as to the use to which the sculptured blocks referred to had been put. He could not agree with Mr. Fergusson that the roofs of Greek temples were semicircular.

Mr. Penrose seconded the vote of thanks, and took the opportunity of saying that architects should feel grateful to Mr. Fergusson for bringing forward a plausible theory for the hypæthron. The rough-and-ready mode of cutting a hole in the roof was inadmissible with so refined a people as the Greeks.

Mr. Fergusson, in replying on the discussion, said he did not dispute the accuracy of one of the dimensions given by Mr. Wood; on the contrary, he had quoted Mr. Watkiss Lloyd's researches in proof of their accuracy. Notwithstanding the criticism to which his paper had been subjected, he saw no reason, he said, to change his opinion on any one point he had advanced that evening, and he then controverted with apparent success Mr. Wood's chief objections.

The Chairman (Mr. Charles Barry, president), in putting the vote of thanks to the meeting, said he would not, if he could, add anything to the refined speculations and arguments which had been placed before the meeting. The members of the Institute had good reason to thank Mr. Fergusson for any paper which he brought before them, for he was known to them all for his great patience and perseverance in ascertaining facts, and, having got them, for the boldness and originality of thought with which he put them together in support of his theses. In the present instance there was great probability of the correctness of some, at any rate, of the views enunciated. The mode suggested by Mr. Fergusson for the lighting of temples seemed to commend itself as a most likely method of lighting those great buildings and their contents. On the part of the Institute he cordially thanked Mr. Newton for his kind invitation to the members to visit the British Museum.

The motion was carried with much applause, and the proceedings concluded with the announcement that on Monday next, the 5th inst., Mr. F. C. Penrose would read a paper "On the Optical Refinements of Greek Architecture."

A NEW WORKHOUSE FOR CAMBERWELL.

In consequence of the existing workhouse in Havil-street, Camberwell, having been found to be too small, and in several other respects unsuitable for the purposes of the parish, the guardians have resolved upon the erection of an entirely new building on another site, and designs having been sent in by several architects the guardians have just made their selection, Messrs. Berriman, of Wilson-road, Camberwell, having been awarded the first premium for his design, whilst the design of Mr. R. P. Whellock has obtained for him the second premium.

As is unfortunately too often the case in these architectural competitions, some unpleasant feeling has been manifested in the matter, and it was more than insinuated at the last meeting of the guardians, when the subject was under discussion, that some member or members of the Board had been guilty of a breach of confidence, and were in collusion with one or another of the competitors.

The Rev. Mr. Drew, in drawing attention to the matter, said it would be remembered that their proceedings in reference to the designs were of an entirely private and confidential character, but he had since found that some member or members who were then present had made certain statements outside the building which certainly ought not to have been made. Since the meeting, a friend whom he met said to him, "Oh, you have been voting against the design of So-and-So," mentioning one of the designs submitted to them. He (Mr. Drew) answered that he had done nothing of the kind, and that the meeting had voted against nobody at all. The reply of the person he alluded to was, "You need not say so, as I have heard all you have said."

Mr. Turney observed that if such was the case some member of the Board must have been in collusion with the designers. It was a most serious matter for them, as they might easily compromise one another. He added that it was only a short time ago he saw a letter from a firm of engineers in Woolwich. In that letter was enclosed a cheque, and the official was asked if he could exercise his good offices with respect to certain work they wished to acquire. The official very honestly showed the note to his superiors, and the firm had been disqualified from doing any work for the body he had referred to.

We understand that the estimated cost of the intended new workhouse is about 30,000*l.*

ARCHITECTS' BENEVOLENT SOCIETY.

The present urgent necessities of this Society have led the Council to make an appeal for aid towards maintaining and supporting the charitable objects for which it was founded. The distress and painful circumstances under which applications for relief are made can scarcely be realised except by those who have to administer funds totally inadequate to alleviate sufficiently the many deserving cases presented to their notice.

The Society was established to ameliorate the wants of those of the profession who have failed wholly or partially in the "battle of life," and to assist the widows and orphans who have been left in an impoverished, often in a destitute condition, and its benefits are not confined to metropolitan cases, but extend to the provinces. The funds are carefully administered, and we hope some of our flourishing readers will send a cheque to Mr. J. G. Turner, 15A, Wilton-street, directly after reading this paragraph,—not to-morrow, but to-day. An old epitaph says, what many a man has thought on his death-bed,—

"What I spent, that I lost;
What I gave, that I have."

SURVEYORSHIP ITEMS.

Dorking.—At a meeting of the Dorking District Highway Board, on the 25th ult., the application of the surveyor (Mr. William Rapley) for an increase of salary was considered, and it was resolved that the salary be raised from 150*l.* to 180*l.* per annum.

Mountain Ash.—Mr. John Herbert Jenkins, of West Cross, Mumbles, Swansea, mining engineer, has been appointed surveyor to the Mountain Ash Board of Health. There were nineteen applicants for the office.

Wednesbury.—At a meeting of the Wednesbury Local Board on the 22nd ult., Mr. Stevenson, one of the members, said he had a very serious matter to bring before the Board. An arrangement was come to a short time ago with their surveyor (Mr. Fereday) by which his salary was raised to 300*l.* per year, on the understanding that he should devote the whole of his time to his duties. Their surveyor, however, had engaged in a contract in a neighbouring town. About two months ago the Sedgley and Coseley Local Board advertised for tenders for the making of some new streets in their parish. The lowest tender, which was accepted, was in the name of Harthill, a man who had formerly worked for the Wednesbury surveyor, but from what he could hear he was merely the nominal contractor. He was prepared to prove that their surveyor had visited the surveyor of the Coseley Board, had taken tracings of the plans, and brought away specifications of the work previously to the contract being sent in. He also visited the brickyard of Messrs. Whitehouse, at Bloomfield, in connexion with the ordering of the materials for making the street. He could also prove that their surveyor engaged some workmen on those streets; that his boxes and tools were in use there; and that he was in the habit of going two or three times every week to superintend the work being done. He (the speaker) did not think that the Coseley Board, as a Board, were aware that Mr. Fereday was connected with the contract, but some of the members were aware of it. When the matter was before the Coseley Board, no one knew Harthill; but the Board was informed that Mr. Fereday had given him a good character, and said he had done work in Wednesbury, and would carry out the work properly. That was a very serious charge, and if substantiated, the confidence of every member would be shaken in Mr. Fereday. He then moved that a committee be appointed to inquire into the charges. Mr. Fereday said he denied the charge. He was neither engaged nor interested in any contract, and he demanded the name of the author. After some discussion, Mr. Stevenson gave notice of his intention to move, at the next meeting of the Board, that a committee of the whole Board be appointed to investigate the charge against Mr. Fereday.

THE METROPOLITAN BOARD'S PROPOSED STREET IMPROVEMENTS, 1877, AND THE NATIONAL GALLERY.

Sir,—I have read with much interest the letter of Mr. Crane, churchwarden of St. James's, Westminster, in last week's *Builder*. He states, with justice, that the scheme now proposed, in its essentials was suggested long since by Mr. Bidgood, Mr. Toogood, and others, including himself.

It is, I think, a matter of public regret that the plan has not been carried out as then proposed. In that case the ratepayers would have been saved a heavy burden, and we should have had an underground railway, as well as new streets. The railway company would have made the streets, asking only for a reasonable contribution from the Board of Works, and the three great northern railways would have been practically brought down to Charing-cross, and there connected with the southern lines.

A part of the scheme, moreover, contemplates an improvement which is greatly required in the interest of the National Gallery, viz., the formation of a new street on the west side of it, connecting Trafalgar-square and Leicester-square, and isolating the site of the National Gallery. I say the site of the National Gallery; for although the western part of the site is now occupied by St. George's Barracks, it is impossible to suppose that they will always be allowed to hinder the development of the National Gallery, which must ere long be demanded by the public.

The military authorities are always naturally reluctant to give up anything; but the barracks have long been condemned as unhealthy and too small; and even the Duke of Cambridge has stated that the troops now placed there might advantageously occupy other quarters if these can be found near to the public offices. It is, in the meantime, quite clear that the site at Trafalgar-square is not large enough for a National Gallery worthy of the nation, and barracks also. The National Gallery must turn out the barracks or the barracks the National Gallery,—which is it to be? I sincerely trust that the Government will no longer evade this question. It must be faced sooner or later, and the longer it is delayed the greater will be the difficulty and the cost to the public. The national collection of pictures is of growing importance, and our millionnaires may be expected to follow sometimes the example of Mr. Wynn Ellis and others. The public has a right, therefore, to demand that official apathy should not be permitted to discourage such benefactions, and that advantage should be taken of the present opportunity of securing, in conjunction with the Metropolitan Board of Works, such an arrangement of streets as shall secure the isolation, safety, and sufficiency, of the National Gallery.

The plans as now published are far from answering to such a description, for they curtail seriously the already too limited site available for building, and would render almost impossible the enlargement of the National Gallery on anything like a worthy scale to the north and east, and they also omit the new street on the west side, which formed so excellent a feature of the original scheme. With reference to the railway, it ought not to be too late even now to combine it with the plan of the Board, and thus gain an immense public convenience, with actual saving of cost to the ratepayers. The whole plan ought to be carefully considered in the interest of the public, in order that we may be sure that we obtain the maximum of advantage from the necessarily heavy expenditure, which will amount to millions. Improver.

THE NEW IMPERIAL COURT THEATRE IN VIENNA.

No one looking at the insignificant and tasteless structure on the Michaelerplatz in the imperial city on the banks of the Danube would think it the representative stage of the German drama, much less the favourite theatre of a court fond of splendour and cultivating the fine arts, and of a people than whom there is none in the world who love the Muses better and encourage their disciples more. Yet the old Burgtheater, with all its inconveniences and drawbacks,—its narrow corridors and steep stairs, its unadorned auditory, its small boxes and uncomfortable seats,—is as dear to the theatre-going Viennese as to the London generation of playgoers long passed away was old Drury. For, in the old imperial Court Theatre, with the rise of the curtain, all sense of disappointment and criticism of the surroundings vanished, to make room for admiration and the rare feeling of real and ample artistic enjoyment. No wonder that the Viennese harbours in his breast an almost affecting attachment to his old playhouse, and that the enthusiast of the Burgtheater looks upon the pending emigration of the "court actors" to a larger, more elegant, and more comfortable theatre as equivalent with the decadence of the Vienna stage. However, the fiat for its destruction has gone forth, while a more worthy home is already in course of erection. In giving his assent to the scheme, the Emperor was especially influenced by the latter reason, but it was also necessitated by the planned reconstruction of the Burg (the Imperial Castle),—which will involve the demolition of the present theatre,—as well as by the latter's exceedingly dangerous nature in case of fire.

The drawing up of the plans was confided to the architects Gottfried Semper and Baron Hasenauer, the creator of the Vienna Exhibition buildings, of a premiated design for the façade of Florence Cathedral, of the plans for the reconstruction of the Imperial Castle of Vienna, and co-operator with Semper in drawing up the plans for the Imperial Court Museums. Baron Hasenauer was also appointed to superintend the carrying out of the works. At the recommendation of the architects, the area gained by the demolition of the Löwelbastei was fixed on as the site. No better could have been chosen, as will be seen. The new building will be on one side of a square surrounding the Rathhauspark (Town-hall Park), the other three sides being formed by the gigantic Rathhaus of the architect Schmidt, the university buildings of Ferstel, and the Houses of Parliament of Hansen respectively. Thus a square will be created which, in grandeur of its perspective and the beauty of its architecture, will form one of the principal attractions of the "Kaiserstadt," and one of the most imposing architectural *ensembles* of the world.

A few words as to the site. It is a spot memorable in the history of the world, and of especial significance now, being a boundary stone standing out prominently in the annals of that conquering race the rapid decay of which we are now witnessing. The Ottoman storm tide which would have burst irresistibly over Western Europe if a bulwark had not opposed here a glorious resistance was broken at the Löwelbastei, a very appropriate name, meaning the Lions' Bastion. Like lions at bay the citizens of Vienna battled here against the Turks when they, in their second and last siege of Vienna, in 1683, dashed themselves in blind fury against this and the neighbouring Burg bastions. Count Rüdiger von Stahremberg could hardly oppose 20,000 defenders (of whom 7,000 were armed citizens, the remainder being mercenaries) to the 250,000 Turks under Kara Mustapha. The city, in heroic sacrifice, burnt down all the suburbs, stretching at that time close to the ditch, as soon as the Turks approached, a spectacle which has been compared by a chronicler with the burning of Troy. The citizens had to resist until the united relieving army of Germans under the Duke of Lothringen and Poles under King John Sobieski could concentrate and bring assistance to their hard-pressed city. The Turks had essayed repeatedly, but in vain, to storm the Löwelbastei, barely in a defensive condition, but held bravely by the Viennese. Fresh breaches were continually being made by the Turkish heavy ordnance: their mines extended already as far into the city as the Church of the Minorites. When distress had reached its highest pitch, and further resistance, notwithstanding all the sacrifice and fortitude of the brave defenders, seemed almost useless, fire signals from the Leopoldsberg announced the approach of the army of relief, which, on September 12th, defeated the Turks, and made its entry into the liberated city, the heroic constancy of which alone had rendered that victory possible. On this historical spot, steeped by noble blood, rises slowly the new temple of the Muses.

The new theatre, standing free on all sides, is designed in the style of the Italian Renaissance. It covers an area of nearly half an acre, and is divided into a square centre building, flanked by two one-storied wings, and from which projects towards the façade a nearly semicircular rotunda. It will be seen at the first glance that the centre portion surmounted by a pediment is the stage, while the rotunda forms the auditorium. In the wings are covered carriage approaches for the court and the general public, the stairs, and offices. The much-contested circular façade, employed first by Moller at the theatre of Mainz, and next by Semper at the Dresden theatre, is in the Vienna Court Theatre developed in a happy manner. From the centre of the rotunda juts forth an imposing rectilinear projection, which, with its three doorways on the ground-floor, marks the principal entrance, while its first story has a loggia of three openings surmounted by an entablature. Of the nine openings of the rotunda, consequently, three are in the rectilinear projection, and three in each of the adjoining circular segments.

Our illustration makes a detailed description of the forms and the artistic adornment of the structure unnecessary. It need only be mentioned that in designing the façade the object of blending the forms of Italian Renaissance into an imposing effect had to be kept in view, so as to set off in a corresponding manner the theatre, of small dimensions compared with the neighbouring colossal architecture.

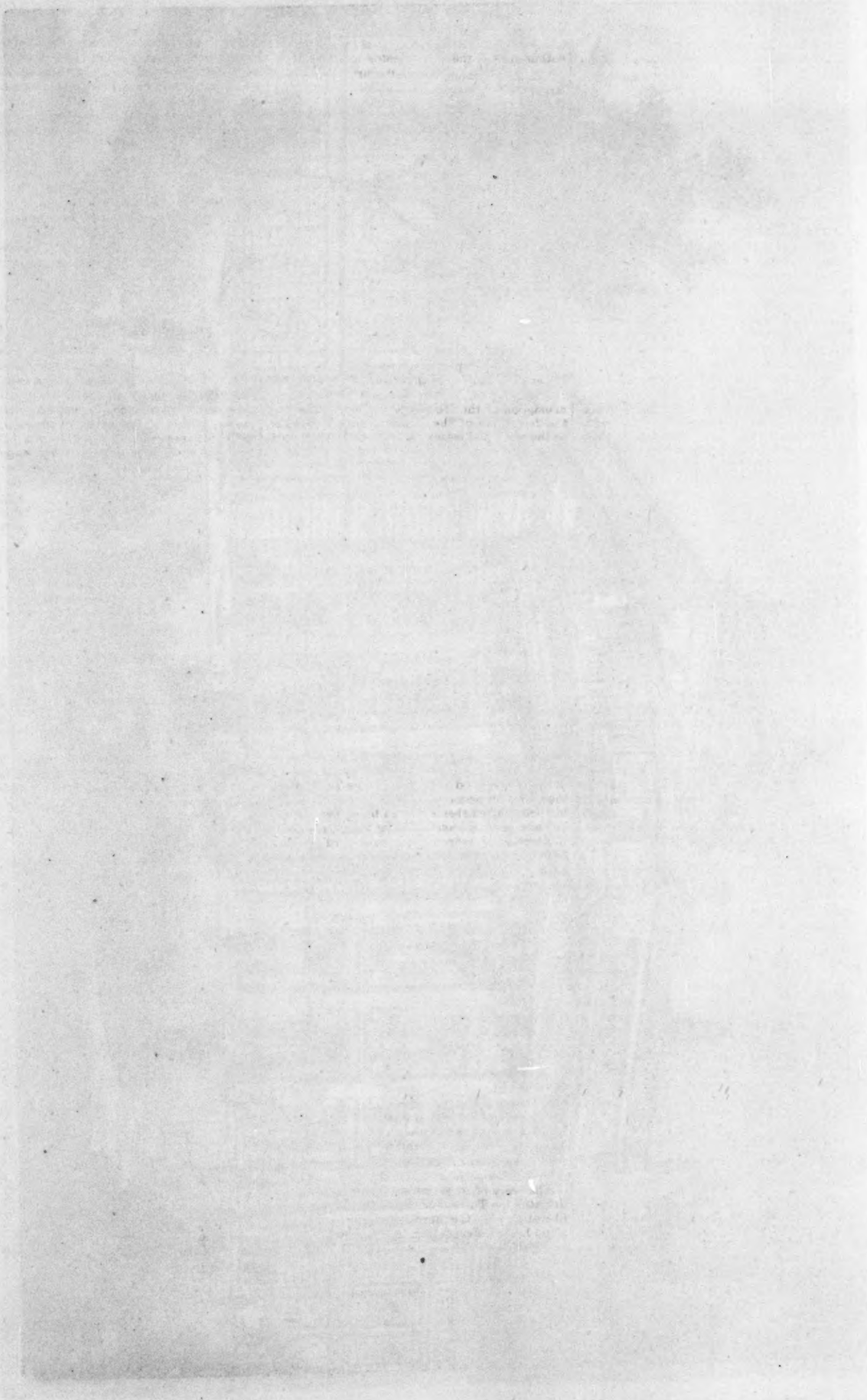
In distributing the interior space the architects had to consult, in the first place, the comfort of the public, but they had also not to lose sight of the effective arrangement of the stage portion. Visitors on foot enter through the nine arcades of the rotunda the imposing vestibule, from which separate stairs lead into the different places of the auditory. Covered approaches are provided for private carriages at the outer ends of the wings, so as not to incommode foot-passengers. At the interior end of the right wing an approach to the Imperial box is reserved, while in the left wing is that to the archducal box. The communications are so numerous, and distributed in such a practical manner, that in case of fire or any other alarm the auditory may be cleared, without crushing, in a few minutes.

Two "foyers," one for the first and second tiers, the other for the third and fourth tiers, are for the convenience of those of the public who, either before the commencement or during the pauses, wish to have a chat or to refresh themselves. The foyer in the first story adjoins the loggia opening on to the Ringstrasse and the Rathhauspark opposite. The auditorium, calculated to hold 2,000 spectators, and consisting of pit and four tiers, is nearly circular, and rises perpendicularly. According to custom, the box of the imperial family lies close to the right side of the stage, in the first tier; that of the archdukes opposite, on the left. The state box, used only on special gala occasions, is in the centre of the first tier. The three lower tiers contain private boxes, but the middle of the third tier is changed into a so-called amphitheatre, with seats. The fourth tier, the domain proper of the Burgtheater enthusiasts of both sexes, is entirely occupied by seats. To each private box adjoins a small saloon, a comfort already enjoyed by visitors to the Imperial Opera.

There are no boxes in the proscenium, which is 43 ft. 3 in. wide at the curtain. The stage proper is 75 ft. 6 in. deep; behind is a supplementary stage, 35 ft. deep, which may be thrown into the ordinary stage when large crowds on the stage require it. On both sides of the stage, in two stories, are the dressing-rooms, one side being reserved for the male, the other for the female *personnel*, with separate entrances from the street. There is no provision for painters' rooms and store-rooms, as a separate building of colossal dimensions has been erected for that purpose, for both imperial stages, in the suburb of Laimgrube.

The construction of the new theatre was begun in 1875, and may take up another four or five years. It has risen to the level of the street, which represents a greater quantity of work done than might be thought at the first glance. The foundations, standing in the former city ditch, and which, on account of the difficult ground, had to be sunk to a great depth below its bottom, have a height of not less than 62 ft. 6 in. The estimated cost of the theatre is 500,000*l*. The nature of the decoration of the auditorium has not yet been decided upon.

Improvements in Clerkenwell. — Some extensive improvements have been made in Clerkenwell, by the authority of the Metropolitan Board of Works, preparatory to the carrying out of the new thoroughfare which is destined, at no long time, to connect New Oxford-street and Bloomsbury with Shoreditch and the eastern end of London.



THE PROPOSED NEW IMPERIAL COURT THEATRE, VIENNA.—PROF. GOTTFRIED SEMPER AND BARON K. VON HASENAUER, ARCHITECTS.

NEW MUNICIPAL BUILDINGS, READING, BERKSHIRE.—MR. ALFRED WATERHOUSE, ARCHITECT.

THE NEW MUNICIPAL BUILDINGS, READING.

THE new municipal buildings for Reading were opened not very long ago by the Lord Mayor of London. The style adopted by the architect, Mr. Alfred Waterhouse, is modified Gothic. The buildings are of local grey brick, with red brick dressings, relieved with red terra-cotta from the neighbourhood of Norwich. The architect was somewhat cramped by the nature of the site. The principal feature in the structure is the entrance-tower, which supersedes the old entrance to the Town-hall. The portion of the buildings facing the Market-place is three stories high, and that facing Vastern-street has two principal stories, with the hall-porter's rooms above. The Council-chamber is 36 ft. long by 25 ft. wide, and 24 ft. high, with an ornamental ceiling. In this room there is a gallery for the public, 37 ft. by 12 ft. The bay-window is 18 ft. by 4 ft., and access to the gallery is obtained by a separate staircase. There is a lift in connexion with the gallery, for hoisting coal. Access to the tower is secured by a flight of steps 9 ft. wide. There are three doorways, two of which will be for the public. The old Council-chamber has been shortened, and will be used as a committee-room. On the ground-floor, in the direction of the Market-place, are two rooms for the town-clerk, and rooms for the deputy town-clerk and the borough-surveyor, also four strong rooms for deeds and muniments. Over the town-clerk's offices is a large committee-room, and above it five rooms for the hall-keeper. In the tower is a clock-chamber affording room for a carillon of bells. The roof of the building is high pitched, and covered with tiles. The total cost is estimated at 10,000*l*. Messrs. Parnell & Sons, of Rugby, were the contractors, and Mr. Buttrell, clerk of the works. The furniture of the new Council-chamber was made from the architect's special designs, by Messrs. Blowers, of Reading.

MODERN BUILDING IN THE CITY.

ARCHITECTURAL ASSOCIATION.

AT the ordinary fortnightly meeting of this Association, on the 26th ult., Mr. H. C. Boyes, president, in the chair, the following gentlemen were elected members, viz., Messrs. C. M. Shiner, J. Dunn, E. H. Bruton, J. A. Thomas, R. Potts de Redder, and R. Kendrick.

A vote of thanks was passed to Mr. E. C. Lee for his kindness in allowing the members to visit the new church of St. Mary, Whitechapel (described in our last); and it was announced that the second visit of the session would take place to-day (Saturday) to Messrs. Waterlow's new printing and stationery works, Finsbury-market, described with illustrations in our volume for 1876 (pp. 433–437).

Mr. T. Chatfeild Clarke then read the following paper on "Modern Building in the City":—

The City of London is being rebuilt. The causes for such rebuilding are clear. Not only have the existing houses become unfit by their arrangements for the wants of commercial life as now carried on, but the mode in which the space has been covered is inconsistent with the economical use of valuable areas, and in a great measure this cause has been the mainspring of much activity. It is not the main element of my subject to touch upon the question of the value of land in the City; but it must be clear, on reflection, that the varying character and value, consequently, of special sites and areas is the factor which determines the special class of building; and the success, or the contrary, of many a development of a building site depends on that nice adjustment of the building to the special want of the immediate locality.

Looking back over a space of a quarter of a century, or thereabouts, what a difference do we find in the City of London! Improved streets, new thoroughfares, such as Cannon and Queen Victoria streets, formed; new and extensive markets; gigantic railway stations, with hotel accommodation; new City halls, enormous stacks of offices and warehouses, taking the place of many an open and almost unused garden or yard; and a viaduct formed to span Farringdon-street, with all its approaches; making a series of works, independently of new bridges, which would do credit to any city in the world. I can well recollect being concerned in the making of suggestive designs for the line Cannon-street, or rather its extension and widening, should take; and I well remember at a later date how enthusiastically and energetically the chairman of the Committee of the Corporation carrying out this improvement worked at its development, despite the prophecies of many that it would be a failure. How little was it foreseen that with all the improvements that have been made, at this moment, from the growth of traffic, especially in the east of the City, much more requires to be done, and that even with respect to Cannon-street itself, though receiving a large measure of traffic, the pressure on the open space opposite the Mansion House and in the Poultry is so great as to render it almost dangerous to cross, and the widening of the Poultry and the eastern end of Cheapside has become a matter of necessity, now, I am happy to say, in course of completion. Into the controversy about a new bridge I will not enter: suffice it to say that whether such be formed at a point near the Tower or not, I believe a new street or an extensive widening in the Eastcheap district is the great necessity of the hour, and it will be much to be regretted if the spirited Corporation of the City do not take this matter in hand, in the event of the new street to Fenchurch-street and its widening being delayed.

The task I have undertaken lies in a narrower sphere,—viz., to give some account of the principles and practice of the execution of a large amount of modern building in the City, and to render such account as full of practical hints as I can make it. Every candid man who has any experience on this matter will admit, I think, not only the difficulties surrounding a City practice, but that by a large number of architects practising in the City the difficulties have been met, and substantial and handsome buildings adorn many a City lane or narrow street,—buildings in which no elements of sound construction are wanting, and in which meanness and "scamping" are wholly absent. As to the larger question of the want of unity of design, with a certain kind of fragmentary and detached look about many buildings therein, you will, doubtless, expect me to say a few words. Each building, no doubt, presents as much *unlikeness* to its neighbour as the efforts of the designer have seemed to make possible; but it becomes worth while to consider whether those modern streets in the City, which are somewhat more uniform in general character, are equally interesting either to the artist or to the general public. Take, for instance, either Moorgate-street or King William-street: immensely in advance as they were of previously-existing streets, must it not be admitted that there is a dull monotony and flatness wearisome to the eye? Again, in Queen Victoria-street, does the street lose in general effect by a large diversity, with a minimum of combined uniformity in the designs of blocks? It cannot be denied this is a practical question of great interest and importance. Our streets have lost the picturesqueness of gabled and overhanging roof, of bay window, corbel, and carved projecting porch. Space has become too valuable to lose a foot, and the architect has been almost driven to get all his depth and play to his building in the depth of the wall itself, with what cornices and balcony he can get. If you, then, require a unity of design, carried out by the mind, not of one, but many designers, do you not lose the individuality, the genius, and scope of the artist, to produce possibly what may offend none, but which may not meet the special wants of any? I am inclined to think so, and to believe that any survey of the City of London by the young architect in search of examples or experience will show him, in many an out-of-the-way corner, a building with its own character and design, at once stamping upon it a record of personal care and thought. This detached mode of dealing with City buildings arises, in a great measure, out of the circumstances of the case. Leases fall out, the lessor naturally desires the market value of the ground, and in order to recoup himself the lessee must, without loss of time, or waiting for adjoining leases to fall in, construct the best building he can on the site. Many a time it gives a real and lasting source of regret to the architect concerned to destroy that which in substantiality, in picturesqueness, in quaintness, and character, he would gladly preserve. Such was my feeling with regard to the demolition of the houses in Lime-street. Every suggestion that I could make to myself failed as to a profitable utilisation of the whole site, which was very large, standing, as these houses did, on the only available street frontage. As you probably know, every care was taken to preserve the chimney-pieces and specimens of the carved work, and I have good reason to know that at no distant date the South Kensington Museum will have these specimens of both ready for the inspection of the public. Again, in Pudding-lane, lately, it has been my duty to have removed a building of singular interest, containing a slab in the basement with the following inscription:—

"Here by ye Permission of Heaven Hell broke loose upon this Protestant City from the malicious hearts of barbarous Papists by ye hand of their agent Hubert who confessed and on ye Ruines of this place declared the Fact for which he was hanged (vist.) that here began the Dreadfull Fire which is described and perpetuated on and by the neighbouring pillar. Erected anno 1680, in the Mayoraltie of Sir Patience Ward, Knt."

You will see by the drawing I present of the front next Pudding-lane what a capital specimen it was of brickwork, really admirably preserved, clean and sharp, and well worthy of the thought of others from its simplicity and unity of general character. My effort in the new structure has been to preserve a red brick front, but to utilise to the full the light needful for the building. I know not how this demolition of the old and replacement is to be avoided, even if interfering with many a gabled and overhanging front, with carved porch, or fine oak staircase. The law of supply and demand is asserting itself; the commerce of the City and each special market requires that those engaged in trade should be on the spot where it centres; and this necessitates that many a house of an old merchant-prince should give place to a stack of offices capable of taking twenty times the number of occupants on its area. The foresight that can see in the possible development of a site a large and profitable speculation after the payment of a large ground-rent has rewarded during the last few years many an investor, and, I am sorry to say, by some few unworthy speculators; and I know of no more legitimate field for the investment of capital than one with all the elements of soundness arising from the possession and development of a good City freehold. The difficulties encountered in such development I must not allow you to think lightly of. Our forefathers had a strange predilection for making the divisional line of their buildings often over a public passage, or one that has become such; their timber construction offered no obstacle to such an arrangement. The Metropolitan Building Act and the necessary protection against fire offer considerable difficulties in dealing with such cases. Again, our predecessors thought little of intermixed property. In not a few cases I have met with in the City of London, the vaults would run under the adjacent owner's, and his upper stories run over the owner of such vaults, requiring a good deal of equitable adjustment of values and areas. Again, our ancestors thought little of the nature of their foundations; in many cases, and notably in one recent case, I have found the heaviest class of building resting on the blackest of mud, and often the basement is found honey-combed with cesspools, drains, and dry wells.

It cannot be necessary for me to remind you of the difficulties connected with the easements of buildings that now come under the management of the architect to surmount in the construction of most modern buildings. The audacity that would construct a new building regardless of the light that may be essential to the business of the adjoining tradesmen must be met by firmness and fair consideration for each party: we stand in a position of equitable jurisdiction, not to allow such questions to be made the means of extortion on the one side, or of adding to the value of an adjacent property in the course of reconstruction at the expense of the owner of the ancient lights adjoining. It cannot be denied that this subject requires much care in the construction of a modern building, but each case rests to a considerable degree on special circumstances, and it is hard to see how any general law can be framed applicable to all cases which may not practically do an injustice. The light required for a diamond merchant cannot be defined by angles of 45° laid down haphazard on a plan. There are cases not difficult to find in the City, however, where a rigid adherence to a special angle has created such a curtailment of a building as to make it positively an eyesore and irreparable damage.

Another fruitful source of litigation and delay in the construction of modern buildings are all the questions arising out of the rebuilding of party-walls, and the injury consequent upon such rebuilding. I can recollect a case where no less than eight suits were threatened, arising from this difficulty and the light and air question, in the reconstruction of one building; and only by a

spirit of conciliation, with a firm maintenance, nevertheless, of the rights of your clients, can these questions be settled without recourse to litigation in any. It is well for an architect to recollect that the operation of the Building Act as now framed does often inflict on the adjoining owner an amount of practical loss and hardship, by laying him open, by interfering with his trade, by driving away his tenants, by dust, and the like, not provided for by the said Act, which may naturally, and specially in the mind of a short lessee, render him very sensitive, and worthy of some equitable consideration, to avoid, if possible, litigation. Nor can it be said that the difficulties connected with uniting buildings of different owners can be looked upon as slight. The necessities of trade demand an acquisition of fresh premises; the differing owners naturally object to any intermixture that may serve as the basis of litigation in the future. It is here that the architect may show a reasonable regard for the wishes of all by preserving a line of columns on the upper story, by defined walls in the basement, and clear plans on the deeds as to future restorations of the added premises intact. Again, the architect in any large town has now to deal with the powers justly and wisely given to many corporations requiring the owner to surrender a portion of his land for street widening. In the City of London this power has been exercised most usefully to the citizens at large, and on the whole in great fairness to the parties compensated. It would appear to be the wisest course here to weigh the circumstances of each case, and to make the claim commensurate with the loss, having regard to the whole property.

I am by no means mentioning these matters to discourage those who are entering on the active duties of life. Energy, resource, courtesy, straightforwardness, and gentlemanly feeling, will do much to make the arrangement of professional difficulties easy. Any man singly, anxious to advance the interests of his client, with no undue desire to hasten to get wealth, will win the regard of that class of men who are truly worth working for; and I know of nothing more satisfactory to the man in advanced practice than to feel that, as years go by, his client again and again returns to him as he would do to his family solicitor or other confidential adviser. To feel that you have, at moderate cost, and with prudent outlay, secured to a man, and probably his family, an enhanced and secure class of fortune, is no slight source of satisfaction; at the same time it may be the duty of the architect to stand firm on many matters of design, and to lose a commission sooner than consent to erect that which would be a standing reproach to him by its meanness or unsuitability. On the contrary, how great a source of lasting satisfaction a good design becomes when well and thoughtfully worked out.

Amid the persistent depreciation of architects at the present moment, the respectable practitioner can afford to smile, and treat with contempt the insinuations so freely thrown out in the columns of the press. Conscious of rectitude himself, though a member of a profession to which there is no bar at the entrance, he cannot deny that there may be a limited number of black sheep; but it is hard to stand by and hear these charges made as applicable to the whole body. It is so easy to charge jobbery, bungling, and corruption against a whole class of men, without venturing to name any,—the only point that is certain in my experience being this: that the man who is meanest in his relations to a professional man, is the man ever readiest to make these charges. Be it our duty, in our societies, in our individual practice, in our social relations and every corporate capacity, to brand the man capable of dishonouring the profession, and apart from this, "to go on our way fearlessly."

I now propose to give in a short compass some of the leading characteristics of various classes of city building, dividing the same into,—1st. Warehouses and wharfs. 2nd. Office buildings, banks and insurance offices, and the like. 3rd. City halls, clubs, and public buildings.

Warehouses and Wharfs.—The elements of design in warehouses would seem to be simple, but to be successful I believe the only way is to get clearly into your mind the working of the special business. The means of entry of goods and their discharge from the proper departments are some of the first elements of the design; with full provision, by lifts, cranes, and jibs, to raise and lower the goods to and from the different floors. This leads me to the consideration of a suggestion which has not yet been much adopted in the city of London, viz., to have a means of loading and unloading goods on a reserved area within the building. Much trouble will be saved with the police, and it is possible to combine access to two or three buildings from one yard. In waterside premises special attention must be given to the position of loop-holes in relation to unloading from barges and the difficulties of overlapping the adjacent frontage if not carefully studied. Of course the question of strength must always remain one of the prime essentials in this class of design,—so accurately to estimate your strength, from the lightest fancy goods warehouse to the heavy waterside one as to meet the speciality of each. Here great judgment will be wanted as to the substructure of the building. In the heaviest class of warehouses, if brick piers are resorted to in the vaulted basements, the harder class of bricks, such as paviours, must be used. The calculations, too, must be carefully gone into as to the iron girders, always remembering that there is a tendency on the part of the parties using warehouse property to strain the building to the utmost it will bear; and even in the lighter class of warehouses, wrought iron should be freely used in girders, lintels, and the like. It becomes, too, of great importance to consider the material of the floors themselves. Whether iron joists and concrete, brick arches and tie-rods, tile arches, joists in iron and stone, or whatever material is adopted, ample means of testing, or perhaps better, loading, should be resorted to before the building has progressed too much. One constant source of difficulty in the arrangement of large warehouses is the restriction of the Metropolitan Building Act as respects area, the fact being constantly that a building may be just over the 216,000 cubic feet without being substantially large enough for two, and some reasonable licence should be given to the district surveyor to adjudicate in such a case. In one case I adopted the plan of dividing the warehouses, but approaching them by a common staircase, fire-proof in character, with wrought-iron doors on each landing, care being taken that the goods could be run through interruptedly, and a perfect line of communication maintained. The point that, of course, dictates mostly the arrangement of warehouses where the exposure and sale of goods is one of the chief uses of the building, is the amount and disposal of the light. Here come into consideration the questions of internal lighting as well as window surface, by wells to the different floors, also special arrangements, to avoid a glare of light, both as injurious to the goods and to their sale, and the necessity at times of a good north light,—the great value of land and the limitation of areas making it a matter of regret that owners of property are often unwilling to give up a sufficient area for lighting, thereby diminishing the letting value of the property. The plan of internal lighting has many advantages: it enables counters so to be arranged for the exposing of goods as to be attractive and easily served; it also forms a capital air-shaft to a warehouse; but it has the disadvantage of dust falling on to the lower floors, and it is to be feared that such shafts greatly accelerate any fire that once has a hold on the premises. The building of all classes of warehouses has been very considerable of late years. Of the heavier descriptions, such waterside warehouses as Humphery's, Scovell's, Mark Brown's, Butler's, the Dublin Steam, the Leith and Glasgow, Brooks's, Spicer's, Dyers' Hall Wharf, and Red Lion Wharf, are examples. On the other hand, in the wholesale trades in the City, such warehouses as Blumberg's, Cook's, Morley's, Foster, Porter, & Co.'s, Meeking's, Copestake's, Devas's, Ryland's, &c., show a large amount of good work; whilst of the lesser class of warehouses it would be invidious to speak, they are so numerous and so rapidly increasing. It is recognisable by all that throughout an extending area around the City, warehouses are being built of no mean pretensions, and that in the character of their designs externally their real use is set forth. Simplicity of design, boldness of feature, character with either vertical or horizontal treatment, and no rigid adherence to a style of architecture unsuitable to the wants of the building, are the essential features of success. The manufacturing premises especially connected with the printing and stationery trades in the City should not be lost sight of. In such premises as Messrs. Cassell, Petter, & Galpin's, and Messrs. Waterlow & Son's, you find the plan and arrangement of the same largely subordinated to the most efficient mode of using steam power in the machinery.

Offices, Banks, and Insurance Buildings.—We have now advanced to a higher type of building, and one to which the main energies of building investors have been directed of late years. Whole streets and City lanes have been almost rebuilt; take Mincing and Mark lanes, Lombard-street, Throgmorton-street, Broad-street, and many others, and you have evidence of this fact. The guiding principles of the designers it cannot be necessary to seek far. Unless the premises have been designed for the special wants of a particular firm, then the architect commences on the basement by a development that in many quarters of the City would treat such portion as offices, utilising the darkest parts for strong rooms; on the ground-floor,—the most valuable one,—he utilises the area to the full, with ample height of story, and with often an inevitable sacrifice of the architecture for the light in the street-front, and he secures by lanterns, or otherwise in the rear by vertical lighting, that which is indispensable. In the design for the Royal Bank of Scotland I have endeavoured to deal with the difficult question of the indispensable sacrifice of the solidity of the ground-floor in a somewhat unusual way, viz., by putting the two lower stories under an arcade, but giving great depth and boldness to the three-quarter columns carrying the superstructure. I have said this is a treatment that is indispensable; with great depth in valuable premises, with questionable back lighting, and a narrow street and high buildings opposite, the treatment necessary for shop property must in spirit be maintained. You regret it, but you succumb to the inevitable; the design if executed otherwise will be to the owner in the future not only a loss of great importance possibly, but an annoyance he will ever be striving to remove, possibly by an alteration in the future that would seriously affect the whole. As you rise to the upper floor,—and, indeed, this remark applies to many ground-floors,—the possible subdivision must be dictated by the wants of the locality, the means of subdivision being supplied by the design, but the actual subdivision possibly being left undeveloped. Conveniences, such as lavatories and the like, must be provided in such numbers and in such positions as may be adequate and accessible to all. The staircases and passages it is well to consider as a sort of highway (not necessarily, as regards the latter, unconnected with another building, and if becoming a much-used passage publicity undoubtedly favours letting), and in one respect very large blocks of offices have obstacles to fight against, compared with others, in the fact that firms placed in them are to a certain extent lost and difficult to find; this, however, may be much met by clearness of method in description of the access to the various floors. Many subjects in every such class of design must engage the designer's mind; the ever-important question of the direction, class, and amount of light; the height of the entrance-floor from the street; the height and number of the floors themselves; the possibility of fire from adjacent premises; and various elements of special fitness for each trade to be carried on, all of them demand the thought of the architect, and upon these points great diversity of opinion exists. In the arrangement of banks it is obvious that security is one element to be carefully studied. Other requirements being,—good space for the public; access to certain offices without intermixture with the clerks; means of careful and easy supervision of the staff; and all the attendant and accessory offices, with greatest attention given to position of the strong rooms, their security both from thieves and fire. The banks in the City of London are unequalled in the world, I imagine, in this latter accommodation, from the practice of leaving in their hands by customers their boxes containing enormous value. In relation to this part of the subject, the National Safe Deposit Company's premises offer a specimen open to much commendation for their completeness and the skill with which they have been carried out.

With respect to the insurance-offices in the City much could be said. They represent some of the finest blocks of buildings it possesses, in some cases with hundreds of clerks, all kept by a clear administrative head in their departments. The building must assist such classification, and utterly fails of its object unless designed so to assist. It seems only becoming and natural that the head offices of these gigantic concerns, with their ramifications throughout the country,

should have both dignity of design, absolute excellence of execution, and loftiness and space in each department. Where so many buildings exist of great merit and in all styles, it is difficult to select; but in Palmerston-buildings, in the large block at the corner of Lombard and Gracechurch streets, in the General Credit Company's offices, Messrs. Huth's offices, Messrs. Shaw, Savill, & Co.'s offices, and others, you have examples of noble blocks of offices; and in the National Provincial Bank, the London and County Bank, the Hand-in-Hand, the Economic, the National Provident, the Queen's, the Scottish Widows' Fund, the National Discount Company, Brooks's Bank, the North British and Mercantile, you have banks, and insurance and other offices, worthy of the City.

City Halls, Clubs, and Public Buildings.—My last head is of a more general character, and refers to those buildings of social and other use, not devoted directly to commerce. I am not anxious to enter into any controversy on the subject of City Guilds; suffice it to say that if, without wholly losing sight of the traditions of the past in an age of a race for wealth, the City Guild becomes a centre for enlightened charity, aid to art, encouragement of education, and elevating social intercourse, it seems to me to need no further defence, and it may well be permitted that these companies should have halls worthy of our time. Some of those existing for many years are well worthy of a visit; such as the Goldsmiths', Fishmongers', and Haberdashers', but of late years, in the Drapers', the Clothworkers', the Saddlers', and the Curriers', we have new halls, on which much money and thought have been spent; and at this moment the Carpenters' Company and the Leathersellers' also, are about commencing to erect new buildings, or to add to their present buildings. We may hope that such liberal expenditure of their money may be an earnest of a like liberal encouragement of art, whether in the direction of technical art-education or otherwise throughout the metropolis. Club life has invaded the City, and at least five clubs exist, three of which are already housed in sufficient buildings, and another is now in course of erection. It is of course difficult to say how far this admixture of social and political life in the City may extend; but it is well to settle the principles of design applicable to this class of building, as far as we can do so. Nothing would appear clearer than that such buildings must partake of the character of luncheon-houses, and that the first principle of the plan should be to make the public dining-room easily and first accessible, and this is the plan of the older clubs, but is not being adopted in the erection of the City Liberal Club. The adoption of a style for a City club in a narrow street also seems to dictate that which will afford an amount of light almost practically unlimited; and here again it is difficult to see how the ordinary Classic type of building can meet such requirements. I have left myself little space to speak of those recently-erected public buildings in the City worthy of notice, but they are not very numerous. Demolition of such in the form of churches has been rather the order of the day, and though all will acquiesce in this when the building had no form of excellence, it is to be regretted that in one or two cases, such as St. Antholin's, all should have been removed. The Rev. Mr. Parker's chapel on the Viaduct, the Memorial Hall, in Farringdon-street, and the Auction Mart, are of varying types of design and merit; but, as a whole, they want that interest both in style and treatment which the ancient history of the City would appear to have dictated. But if we turn to the Bible Society's House, the additions to the Merchant Taylors' Schools, the Stock Exchange, the New Library of the Guildhall, we have good specimens of a class of buildings which are a lasting credit to their designers. It would be wrong in such a paper to omit mention of the large additional building of the Post Office, at the corner of St. Martin's-le-Grand and Newgate-street, marked as it is by scale and general dignity. Nor should we omit to notice some of the restorations of the City churches, which have been carried out with great faithfulness, ungrudging use of funds, and a desire to make them worthy of altered times. No sketch of modern building in the City would be at all complete without a reference to the immense railway stations and hotels adjacent, such as the Cannon-street, the Holborn Viaduct, the North London, and the Great Eastern; but I cannot disguise the fact that an architect must look upon them with mixed feelings. The huge circular roof of the South-Eastern Station has altered the character of the City looking eastward or westward up the river, and, truth compels me to say, for the worse. It is customary to praise the works of engineers as much as it is so to depreciate those of architects. Is not this a case (and many others might be cited) where no attention has been paid whatever to the beautiful? Whilst we admire the scientific skill, we feel a permanent eyesore has been erected. Railway bridges crossing our leading thoroughfares, and in front of important works of architecture, are another form of modern building in the City, which has been a serious detriment to our streets, and the evil effects of which will remain. Of course no sketch of modern building in the City should omit also some reference to the improved markets, though here necessarily internal arrangement does not give very great scope for external grandeur of design. In meeting the wants of an immense population utility must be a source of satisfaction to the public.

In this necessarily hasty survey I am conscious of many omissions, but enough perhaps has been said to show the magnitude and importance of City building and its varied character, which in no way diminishes its interest. Linked as the City of London is with the history of the past, and forming the centre of the largest and most important metropolis of the world, it would be a lamentable thing if its buildings did not reflect somewhat the greatness of its commerce, and if the improvement of its streets did not grow with its increasing wealth and wants. He who enters the City hoping to see grand streets, laid out with symmetry, to see vistas and lines not unknown to the leading cities of the Continent, nothing but disappointment will ensue; but any one who seeks the City to find a bond with the past by many an ancient church, or, it may be, an old city hall, or buildings strictly adapted to modern requirements, sound and well executed, dignified in character and not wanting in fitness or design, his visit must repay him; and if, in addition to his external survey, he will dive into the courts, alleys, and passages of the most busy parts, such as Mincing and Mark lanes, or near the Bank of England or Lombard-street, he will find every foot utilised, all the modern appliances of building resorted to,—iron, stone, terra-cotta, encaustic tiling, best wainscot and mahogany, plate-glass, marble not wanting, executed without pretentiousness or show in any way. He will, perhaps, speculate what is the future of this hive of industry as respects the value of property and the development of building? I cannot pretend to answer such a question, but it is possible some extensive depreciation in the value of money is serving to raise the value of real property in comparison, though in a hidden and not well-understood way; but whatever may happen, let us each trust that there is a great future for the City of London,—that as we look on the noble dome of St. Paul's rising in its midst, there may be work and sphere for many generations of architects, and that they may go to their work animated by Wren's spirit. Certain it is that, amidst the preparations for professional life, no time can be better spent than in studying the principles of the great masters of art in the past, and the City is not wanting in specimens of their work even without reference to the works of living men. I cannot close this paper without warmly thanking those architects who have lent me drawings to assist in its illustration.

In the discussion which followed,

The Chairman said that Mr. Clarke's paper had ably treated of the many difficulties with which the architect practising in the City had to contend, but he had not alluded to the high-pressure system of doing business which arose from the great value of land and the desire of the owners to have their buildings speedily erected. These causes led to haste in the preparation of the drawings and in the erection of the buildings, although it must be confessed that the buildings of the City would stand comparison with those of any other part of the metropolis, or of any provincial town, in all the essentials of good building. One great element of their success consisted in the fact that they were adapted to their purposes, and the supply of such buildings was the natural outcome of the demand which had been made for them of late years. In construction and arrangement these City buildings were well worthy of consideration, although with reference to the purely decorative portions there was room for considerable difference of opinion. To paraphrase a famous saying of the late Sir George Cornewall Lewis, City architecture (or much of it, at any rate) would be tolerable but for its "ornament." The great fault of the majority of new buildings in the City was over-decoration. If we could divest some of the City buildings of everything which the public, and (in too many instances) even their architects, thought "ornamental," the general architectural effect would be very much better than it was at present. In his (the speaker's) opinion, buildings intended simply for purposes of trade or business should not be so highly ornate in character as buildings intended for residence or recreation. There was something in the strict requirements of high-pressure business life which made the ornament in many of the new City buildings appear to be very much out of place, and to jar upon one's feelings. This would be the case even were the ornament well bestowed, but it was still more so when it was laid on indiscriminately. It was true that in many of the buildings of which drawings were shown on the walls this redundancy of ornament did not exist, but they were exceptions. As to uniformity or not in street façades, he thought London showed a very good example to Continental cities in allowing everybody a certain freedom of action; the result, on the whole, was very satisfactory.

Mr. S. Knight said that with reference to the last point touched upon by the chairman, there was no doubt a very great deal to be said on the question. It could not be denied that the diversity of buildings and the variety of designs which our London streets presented had a wonderfully picturesque effect. In Paris, on the contrary, there were enormously long streets, very fine in their way, but treated throughout with such uniformity as to be without that individuality which would enable a stranger to identify them one from another. To a great extent the streets of London were monotonously alike, but each street of any note had buildings in it which gave it a character of its own, and the picturesque was attained by the diverse designs adopted by different owners,—one man having a taste for Gothic, and another a Classic taste, while a third would have a taste which could scarcely be described. At any rate, it was impossible for a man to walk through the length and breadth of the City, especially in the new thoroughfares, without finding something to please him. On the other hand, it must be admitted that the juxtaposition of different designs was often productive of great discordance. Taking a thoroughfare such as the new Queen Victoria-street, and looking at it as a whole, with the various buildings in perspective, it possessed a certain effect of picturesqueness; but the eye was not satisfied when it looked at one or two elevations at a time, because it almost invariably happened that the horizontal lines of each façade, such as cornices, string-courses, &c., were at different heights. He thought that the Association and the Institute might usefully aid the profession by endeavouring to bring about amongst their members some general understanding to the effect that, wherever possible (and in most cases it would be possible), they should design their buildings somewhat in harmony with their surroundings. He begged to propose a vote of thanks to Mr. Clarke for his able paper.

Mr. H. H. Statham said it had occurred to him that one great difficulty in the way of rendering neighbouring façades of different design less incongruous with each other was the widely-prevalent employment of horizontal rather than vertical lines in such façades. Any one looking at the picturesque old German towns, such as Nuremberg, would see that the vertical lines in adjoining buildings did not "jar" with each other, although the buildings were diverse in design and use. But where horizontal lines were used, as in the City architecture of the present time, they might be carried through from building to building on the same levels, without breaking of continuity, even though each façade differed in design. By this means incongruity would be avoided without getting in its place the rigid and despotic uniformity which was so much to be deprecated. He was glad to hear Mr. Clarke's remarks as to the desirability of retaining, wherever possible, the lines or contours of historic London streets, and he hoped the time would never come when such streets would be destroyed merely for the sake of getting a number of right-angled blocks, for we should thus lose a great deal of interest by the process. Reference had been made to the uncouth appearance of

railway bridges and roofs. The unsightliness of such structures was mainly owing to the sharply-defined line of demarcation which existed between the engineering and architectural professions; indeed, there ought not to be two distinct constructive professions, for as long as they had separate existence one set of men would be trained to ignore all matters of artistic taste, while the others would perhaps be too prone to neglect the scientific part of building. It ought to be the aim of both professions to draw together with the view of incorporation. When the two professions became one, there would be far less chance of ugly railway structures being put up.

Mr. S. Flint Clarkson, in the course of some remarks the drift of which our reporter did not catch, asked whether Mr. Clarke had again buried the stone which he found in the house in Pudding-lane?

Mr. Clarke.—No; it is in the City Museum.

Mr. J. Douglass Mathews seconded the vote of thanks to Mr. Clarke for his paper, and in the course of his observations said that one great difficulty which architects had to contend with in designing buildings for newly-made streets was that very frequently such new streets took a long time to develope, and it was almost impossible to hit upon the exact description of building which would suit the wants of the ultimate tenants. It was a comparatively simple matter to design and construct a building for any given purpose or trade; but the architect could not have a more difficult problem set before him than that of designing a building which would be tolerably well adapted for any one of the multitudinous and diverse businesses carried on in London. He agreed with previous speakers in preferring London street architecture to that of Paris. He also endorsed the recommendation made by Mr. Statham as to the use of vertical rather than horizontal lines in street architecture, especially in narrow lanes or thoroughfares. In this connexion he could not help expressing regret that the fine tower and spire of St. Antholin's were now entirely gone, and he feared that, unless we "looked sharp," we should lose other things of the kind. He hoped, however, that in the event of further attempts at such Vandalism being made, the architectural profession and the archæological societies would take the matter up and carry their resistance to the uttermost point. As to fireproof floors, while he thought it was impossible to make a building really fireproof, especially when it contained such things as staircases and well-holes, fireproof floors should always be employed in offices and similar buildings, because they would generally suffice to "localise" any fire that might break out, confining it to one floor.

Mr. Phené Spiers, with reference to the question of uniformity or not in street architecture, said that as he was brought up in the rigid French school of regularity, he was inclined to advocate similarity of style and continuity of line in street façades; but, on the other hand, he had had many opportunities of studying and delineating picturesque buildings and towns, and he was therefore able to see the advantages and disadvantages of both systems of building. He agreed with Mr. Statham in thinking that architects of contiguous buildings should have some regard to each other's work; in fact, he considered that an architect who had to build a new house in a new thoroughfare ought to study the buildings on either side of it as he would study the landscape were he going to build a house in the country. In the case of a *new* building in an *old* street, however, the architect should have full licence to introduce piquancy into his design, but those who came after him in erecting new buildings should follow his design to a certain extent. The reason assigned by Mr. Norman Shaw for forsaking his usual style of work when he had to design buildings which were to be erected in Kensington was that the buildings of the "new departure" would be more in harmony with the houses of the "Old Court Suburb." One could understand and appreciate such a motive, although in the result Mr. Shaw had succeeded in producing buildings as different as possible from the old houses of Kensington. But the same spirit did not animate one of the promoters of the large blocks of shops and offices at the corner of the Poultry and Queen Victoria-street, who was reported to have said,—"Here is the Mansion-house opposite; a little beyond is the Church of St. Mary Woolnoth; while further to the north are the Royal Exchange and the Bank of England, all being buildings of Classic type, besides one or two Renaissance buildings in the locality. This, then, is exactly the place to put up a Gothic building!" Perhaps, however, that was the very reason why it should not have been put there. There was a tendency towards individuality in England which was sometimes disadvantageous, as, for instance, when an architect or his client, or both, refused to assimilate the design of a new building to the style of those surrounding it. As to lifts, he happened to receive a letter the other day from an American architect, headed, "Broadway, New York, —— Block, Fifth Story, *opposite the Elevator*." This would show the importance of attached in America to these lifts. There were one or two lifts in use in the City, and one in a house in Victoria-street,—a perpetual elevator, always in motion. He should like to ask Mr. Clarke what experience he had had of these appliances, and whether there was any chance of their becoming so regular in their working as to supersede staircases in large buildings.

The Chairman having put the vote of thanks to the meeting, it was carried unanimously.

Mr. Clarke, in replying on the discussion, said the question asked by Mr. Spiers as to lifts was a very important one, for he (Mr. Clarke) knew one experienced man connected with property in the City who said that we must ultimately expect to see shops for all classes of business on the upper floors of City buildings, owing to the greatly enhanced value of land. If this prognostication were correct, the question raised by Mr. Spiers was most interesting. So far as his experience justified him in speaking, he did not see any reason why lifts should not work perfectly well.

RIPARIAN OWNERSHIPS: LAMBETH FLOODS.

In the course of the discussion at the Institution of Surveyors, which followed the reading of Mr. W. M. Marriott's paper on "Riparian Rights,—

Mr. C. Norman Bazalgette said that he proposed in the remarks which he was about to offer, to deviate from the paper to this extent that, with the sanction of the meeting, he would discuss the question of the liability of those who had permitted the floods, and the responsibility of those whose duty it was to keep out the floods, and particularly in reference to the Lambeth overflow; but he did not intend to go into the engineering question whether the construction of an embankment on the north of the Thames had sent more water to the other side of the river. That question would have to be fought out at another time and in another place, and he was content to abide the result of that discussion whenever it took place. It seemed, however, to him that, for present purposes, he should be meeting the paper fairly enough if he simply entered into the question of the incidence of the responsibility of preventing floods within the metropolitan area. The point which had been raised with regard to the Embankment, as he had already observed, was outside the limits of the discussion proper, and would only serve to embarrass the legal issue. As it was, there was no engineering argument before the meeting, and therefore nothing to combat. It was true that a mere assertion had been made that the embankment on the northern had sent more water to the southern shore, but in the absence of argument to fortify that statement, a simple counter-assertion would be sufficient for present purposes. With regard to the concluding remarks of the paper, some reference had been made to the Rivers Pollution Act which was passed last session. He agreed with the author of the paper that some of its provisions were beneficial and calculated to do good; but, nevertheless, there were one or two provisions which, to his mind, tended to place a stumbling-block in the way of efficient operation of the statute. To indicate one such defect. That statute provided that no person should send sewage into a stream, and then further enacted that no person should be convicted if it could be shown that he had taken the best practicable means for cleansing the sewage before it passed into the stream. Now, it seemed to him (Mr. Bazalgette) that those latter words impaired the beneficial effect of this provision, for they let in the whole of the vexed question of what constituted the best practicable means. One expert, for instance, would say chemistry afforded the best results, while another would recommend natural or artificial filtration through soil as effecting more complete purification. Thus it would have been far better if the statute had simply provided that, instead of its being necessary to prove that the best practicable means had been used, it should be enough to show that the sewage had been sufficiently cleansed, because in that case the question of sufficient purification would depend upon chemical analysis, which would probably not be much at fault. The author of the paper had confined his remarks to the case of rivers beyond the range of the tide. Now he proposed to take the subject up just where Mr. Marriott had dropped it, and to deal with riparian ownerships fringing the borders of tidal streams, and at the same time to discuss the position of seaboard ownerships, and their relations with each other. First of all, with regard to the common law of the land relating to seaboard ownerships, he thought Mr. Michael would bear him out in his statement of the law with regard to such proprietors, when he said that the principle was fairly laid down in case of Rex *v.* The Commissioners of Sewers for Essex, 1 B. & C. In that case, Chief Justice Abbott decided that, in the absence of proof of special usage binding the individual frontager, all the owners upon a flat like the Lincolnshire flats were bound, in common, to contribute to the expense of keeping up the sea-bank which gave them common protection. But, on the other hand, a special usage binding the frontager on the sea might be proved, in which case he would have to perform the duty of keeping up the sea-bank at his own cost. That law was approved in Morland *v.* Cook, L. R. 6 Eq. Cas. Then there was the remarkable case of Hudson *v.* Tabor, which was decided in the Queen's Bench, and was now being carried up to the House of Lords, and the general effect of which was to confirm the principles of the joint liability of the owners of the flat in the absence of special usage, though special usage and prescription could saddle any frontager with the special responsibility. His friend, Mr. Michael, had called his attention to the fact that the principle of joint contribution proceeded upon the view that, inasmuch as the sea was the common enemy of all, all should combine for the purpose of resisting its incursions.

Passing on from seaboard owners, he would next consider the law as affecting waterside premises situated on the banks of tidal rivers or estuaries, and he thought it would be found that the two cases were nearly analogous. With regard to the statutes which had been passed from time to time for the prevention of floods, he should like, in order to lead his argument with reference to the liability for the Lambeth overflow to a logical conclusion, to refer to some of the principal. The first statute which legislated with this intention was Magna Charta. It only consisted of thirty-seven chapters, and as one chapter, consisting of only about two lines, was devoted to that object, he would quote it in its entirety. He might premise that the words "put down" meant removed or demolished. It ran thus:—"All weirs shall be henceforth utterly put down by Thames and Medway, and throughout all England," the object then being, not as at present, to keep up the locks and weirs to improve the navigation, but to remove obstacles in order that the upland water might flow down as rapidly as possible at low tide, so that the accumulated volume might not be ponded back more than was necessary when the tide was at its full height. The next statute was the 25 Edw. III., c. 4, which was to the same effect. The next was the 1 Hen. IV., c. 12. This latter enabled justices of the peace to make surveys, and also to make orders calling upon the freeholder to break down any such impediment created by them. There was also a provision in the same Act, which made it incumbent upon the owners of weirs and other obstacles to remove them at their own cost, failing which they were subject to a fine of 100 marks to the Crown. The next was the 23 Hen. VIII., c. 5, of which the preamble seems to have been conceived in a spirit of sarcasm, for it began by calling the king "a virtuous and most gracious prince." It then proceeded in quaint language to complain of "the outrageous flowings, surgings, and course of the sea, the occasion of land water and other outrageous springs that flooded low-lying grounds," and it wound up by creating Commissioners of Sewers throughout the kingdom. These commissioners had charge of certain levels, and their duty was to survey and find out where fences against the tides, whether in tidal rivers or in the sea proper, were insufficient, and it gave them power to compel owners to make them good. He believed, as a matter of

history, that the commissioners exceeded those powers, for whereas the statute enabled them to cause them to be executed, they took upon themselves the duty of constructing the necessary works. He would now supply the references to the principal Acts, for the information of those who were desirous of looking into the subject. They were 3 & 4 Edw. VI., c. 8; 13 Eliz., c. 9; 3 & 4 Wm. IV., c. 22; 4 & 5 Vict., c. 45; 12 & 13 Vict., c. 50; and 24 & 25 Vict., c. 133. This last was the Lands Drainage Act, which made the tenure of office of the commissioners perpetual, the term having previously been limited to three years. The last of these commissions was issued in 1860.

He had now stated generally what the law of the land was, both as affecting river frontagers and seaboard owners. Next, as regarded the metropolis, the low-lying lands within the metropolitan area were, like other river-side flats, under the charge of commissioners, and these commissioners had power to inquire where defences were weak, and to make orders concerning them which bound those deriving benefit from their protection. The authority of these commissioners was afterwards supplanted, in the metropolis, by the machinery provided by the Metropolis Local Management Act, though, outside the metropolitan area, the authority in some cases still survived. It seemed to be imagined that because the Metropolitan Board of Works had jurisdiction over the metropolis with regard to some matters, they were consequently omnipotent. Their jurisdiction had been exaggerated. He ventured to say that, with regard to this question of floods, whether within or without the metropolis, no public body, as he would shortly show, could have a much more limited jurisdiction the Metropolitan Board of Works. For instance, outside the metropolis, the Board, by virtue of the land which they had acquired for the purpose of their outfall at Barking-creek, fell under the jurisdiction of the old Commission, which presided over that level, and sometimes received the most peremptory notices to raise their sea-walls. He had brought with him a specimen of these notices. The heading was "East Ham Level." It recited the district to which the level extended. Then it enumerated the names of those members at present composing the Commission, and then made order to this effect:—"That the Metropolitan Board of Works raise their Thames river-wall, and Barking Creek river-wall, as high as the altered standard level, viz., 5 ft. above Trinity high-water mark, or 10 in. above November level of last year." It then went on to provide that the necessary works should be done within a month after notice given, and that, in default, the master bailiff would execute such works, and that their cost would be assessed and charged upon the Board. He had with him another, which was much to the same effect, and which he need not read.

A few words more, and he had done. He was afraid he had exceeded the compass allowed to a speaker, but, in conclusion, he wished to say a word as to the question of liability, particularly with regard to the Lambeth overflow. He need hardly tell them that, as regarded the metropolis, the Commissioners had been superseded by the jurisdiction of other bodies. First of all, their jurisdiction had been superseded by the Commissioners of Sewers. After that, the Metropolis Local Management Act was passed, which was the Act now in operation; and, as regarded the question at the present time in the metropolis, it had introduced an entirely new state of things. He need hardly remind the meeting what the effect of that Act was. At the same time that it constituted a central body, it constituted vestries or local bodies all over the metropolis, those local bodies sending up representatives to the central body, and so forming the Metropolitan Board of Works. The Metropolis Local Management Act, 18 & 19 Vict., c. 120, gave concurrent jurisdiction to the Metropolitan Board and the vestries in some respects, and an independent jurisdiction in others; and where they found independent jurisdiction, they might take it that the Metropolitan Board would not meddle with the vestries, nor the vestries with the independent jurisdiction of the Metropolitan Board. Then whose duty was it to prevent floods, or the overflow of the Thames in the metropolitan district? As the question was at present of public importance, he hoped he should be pardoned for referring to the particular section which regulated this. A section of an Act of Parliament was a dry thing enough in itself, and scarcely a matter of popular interest; but still this section was so clear that it could not be put more tersely or in a more explanatory way if he adopted words of his own. Section 69 of 18 & 19 Vict., c. 120, was to this effect:—"The vestry of every parish mentioned in Schedule A to this Act, and the Board of Works for every district mentioned in Schedule B to this Act, shall cause all banks, wharfs, docks, or defences abutting on or adjoining any river, stream, canal, pond, or watercourse in such parish or district, to be raised, strengthened, or altered or repaired, where it may be necessary so to do, for effectually draining, or protecting from floods or inundation, such parish or district." That seemed plain so far, and it was clearly the duty of the vestry to give effect to the provision. Section 70 apportioned the expense, and showed how it was to be provided for, enabling the vestry to charge the expense partly on the riparian owner and partly on the district; that was to say, it might be divided between the individual and the rates. It might be asked, then, why, if the vestry had power, did they not step in to prevent the floods? The fact was, that there appeared to be some difficulty in enforcing the provision in the case of a refractory owner. The Act of Parliament seemed to be defective. If any one would take the trouble to read Woolrych's foot-note to section 70 of the same Act of Parliament, he would find these words:—"There is some difficulty attending the mode of proving and enforcing liabilities of this nature under the present Act," the author then going on to explain the nature of the difficulty. So that, in fact, there was an obstacle in the way of enforcing the statute.

THE THAMES: COUNTER EMBANKMENT ON SOUTH SIDE.

THIS noble river, which flows for over sixty miles from the ocean, bearing to London the world's commercial wealth, continues its tidal course sixteen miles higher up to Teddington; and for sixty miles further is bordered by rich scenery of landscape unrivalled in any other country.

In former days but little was done for the improvement of its banks, and nothing for the purification of its waters. Receiving throughout its course the sewage of many towns, the shoals of mud on either side at low water were disgusting to the view, and abhorent to the senses; and even yet the citizens or Corporation have paid little attention to the redress of an evil which endangers the health and impedes the commerce of our great and populous City.

The Embankment of the south side, and the expurgation of fœtid mud-banks, is now, however, the object in view; it is a difficult matter to treat, as there are many large and conflicting interests in the way; therefore we will limit the extent, for the present, between Westminster and Waterloo bridges.

It must first be borne in mind that the waterway for the rise and reflux of the tide at London Bridge is but 264 yards; from that point to Blackfriars there is an expansion, the waterway being 334 yards at the latter bridge.

Increasing still, the stream at Waterloo Bridge (of nine arches) expands to 400 yards.

Then at Westminster Bridge (of seven arches) the waterway is 344 yards.

At the latter bridge two of the original arches are stopped, that on the north end by the embankment road and the Houses of Parliament, the other on the south end by the promenade causeway and St. Thomas's Hospital.

The range of wharfs along this line, occupying the whole space between Belvedere-road and the river, varying from 150 to over 500 yards in depth, is certainly the most extensive and important in this or any other city.

It comprehends the Lion Brewery, a handsome and spacious building, having also a large inclosure and stores on the opposite side of Belvedere-road; the great and utilitarian modern structure of Governmental East India Stores; and the lofty Shot Tower and offices; the rest being an irregular line of vast and varied stores; all having back wharfage; and at low water a hideous bank of fœtid mud, extending one full third of the river's traverse.

To obviate so great a default, it is proposed to form a quay wall and canal, *open to tidal influence*, of say 80 ft. or 100 ft. wide, extending from the south arch of Westminster Bridge to the south arch of Waterloo, embracing the whole width of both. Of course, the channel should be cleared out to a depth of 5 ft. or 6 ft. under low-water mark, and two or three openings left for access in the outer quay wall. This would give ample scope for barges which now, together with large quantities of timber balk, lie scattered over the mud-banks at low water.

Commencing at Westminster Bridge, the canal would be 36 yards wide (the span of the arch now stopped up), and an opening should be left, both laterally and through the arch, for the influx of tidal water; the quay wall being carried on in equable line to the south arch of Waterloo Bridge, which would afford free passage for the tidal ebb and flow of the canal.

This mode of embankment would rather expand than contract the free flood of water; and the quay wall being raised by the height of a parapet wall above the mark of the late river flood would vastly improve the aspect from the new and beautiful embankment on the opposite side.

As a matter of course, there should be an opening for the wharf at College-street, as well as two or three others for the accommodation of riparian wharfingers, and light iron bridges should be erected over them.

Whether the proposed embankment should be utilised as a footway or promenade may remain for ulterior consideration. That in front of St. Thomas's Hospital has but a width of 14 ft.; and as the excavation to deepen the canal might fill up the interval of walls, it could add little to the expense.

T. H. H.

THE HISTORY OF THE BRITISH ARTISAN.

VISCOUNT LYMINGTON opened the Spring Session of the Exeter Working Men's Mutual Improvement Society on the 19th ult., by delivering a lecture on "The History of the British Artisan." The lecturer traced the progress of trade and manufactures in England from the Roman period, and the gradual improvement which had been effected in the condition of the British workman through successive ages, giving a sketch of the degraded state of the artisan in feudal times, and making it part of his plan to show the influence which foreigners had exerted in the development of English trade and commerce. The English artisan had ever found among the foreign settlers here some of his ablest teachers. Elizabeth's reign was spoken of as the time from which the stream of national progress could be most distinctly traced. Science awoke in Bacon's day from a long slumber. Coal, the genius of our age, was only beginning to be an important trade in Charles I.'s reign. With the names of Watt & Matthew Boulton we caught the first scream of the engine; the last flight of stairs that touched our own time was reached, the artisan had passed from the slave of the feudal ages, the child of later periods, reproved, protected, and restricted, to emerge as a great vital force, an organ of power to his country and his age. The advance in the intellectual, as well as material, condition of the workman had exactly coincided with the progress of machinery. Although in original conception English manufacturers possessed no advantage over those of other countries, yet in the practical development and application of an invention, and in administrative capability, especially in the art of economical management, they had shown a real commercial genius that was rarely exhibited abroad. The great modern cities, such as Birmingham, Liverpool, Manchester, and Glasgow, gave an impetus to trade which it had never before felt. The two great monarchs, king coal and king cotton, had hand in hand ruled over tens of thousands of subjects; and steam, by its various properties, had helped to turn all England into a nation of workmen. With the working classes now lay the means of national improvement; they had great power alike for evil and for good. But while trade was creating employment on an enormous scale, and wages were increasing rapidly, the domestic habits and surroundings of the working classes in the manufacturing districts were in the early part of this century very lamentable. Living in unhealthy dwellings and narrow pestilential streets, and working in crowded mills, sending their children to begin work at five years of age, their physical condition was shocking. The deformed were to be met with in every street of our crowded cities, and children wore the dejected and weary expression of an overwrought population. Education could hardly be said to exist among them, and at the very moment when the old order was giving way to the new; when large fortunes were

being realised on all sides; when trade was emerging from restraint and tyranny, and workmen from want and servitude, a worse slavery was commencing, and the horizon of the British artisan became deeply clouded. Yet even under these trying conditions there were found—chiefly among the ordinary artisans of the workshop—some better and more enlightened man employing his leisure by adding to what store of learning he possessed, some man endowed with the power of looking beyond the workshop to the great world outside, and beyond the workman to man himself. They could not pass from the period of transition without recognising the vast and self-denying labours of Lord Shaftesbury, whose whole life had been spent in trying to increase the happiness of others, and especially of the working classes. The various Acts of Parliament which the exertions of Lord Shaftesbury and other philanthropists had caused to be passed had produced a wonderful change in the condition of the artisans of our large towns. As their physical condition improved, their education became better, and their amusements of a higher class. Athletics, music, clubs and libraries, excursions, all exercised a beneficial effect. Friendly societies were established to satisfy the growing feeling of prudence and forethought. Trade unions were among the most remarkable signs of the spirit of combination. They represented in a great measure in modern times the part played by guilds in former days. Co-operation had proved beyond all other forms of association of the highest value. In working men's clubs they saw the workman's own wish and determination to acquire those refinements and interests for his leisure hours which belonged to men who possessed a real appreciation of enjoyment, and to whom a larger field of happiness was opened. In conclusion, let them compare the present condition of the workman with that which he had described in the opening parts of his lecture. The last Reform Bill gave to the British workman the summit of his responsibilities. He was now no longer a mere figure in the picture, a subject of passing interest on the page of history; but in his hands lay to no small extent the destinies of his country, and to him men of both the great political parties were now looking as the principal factor in the politics of the future. But the British workman, sensible of his great responsibilities, would remember that on himself alone depended the continuance of his power and influence. He should also remember that an oratory of false sentiment appealed most easily to those who were uneducated, and consequently that, while each individual workman should regard education as due to himself and to his own self-respect, so also workmen, as a body, should seek it as protecting the better interests of their class, as making them to be proof against any illusions or prejudice, as proving to them that the conditions of success in life and politics were an actual ability, a fine discrimination, and a true judgment—that politics and political influence would always be, as they always should be, in the hands of those to whom knowledge gave power and character gave weight.

The Bishop of Exeter, in proposing a vote of thanks to Viscount Lymington, spoke in terms of very high praise of the lecture, the effect of which on his mind had been that of a picture of a familiar landscape in which the artist made prominent the beauty which an ordinary spectator was likely to pass unnoticed.

ARCHITECTURAL SOCIETIES.

Birmingham.—The Birmingham branch of the Architectural Association held a meeting on the 23rd ult., when Mr. J. Roddis, sculptor, was elected an honorary member, and a vote of thanks was passed to Mr. J. A. Chatwin, architect of the new extension to the Exchange, for allowing the members to visit that building. Afterwards a paper was read by the chairman (Mr. A. Freeman Smith) on "Domestic Architecture." The author commenced by describing the primitive character of the domestic buildings of the Anglo-Saxon period, and traced their gradual development down to the time of Elizabeth.

Lincoln.—At a recent meeting of the committee of the Lincoln Diocesan Architectural Society, the place of the Society's public meeting for the current year was discussed, and it was finally agreed that Southwell should be selected for this purpose,—provisionally, first, because it was considered just that some place in Nottinghamshire should be chosen for this purpose; and, secondly, through the fresh interest attaching to Southwell as giving the title to one of the new bishoprics now sanctioned by the Crown.

WHAT IS A BRIDGE?

This question was raised at the Cumberland January Quarter Sessions, the other day, by the chairman asking whether some small bridges referred to in the report of the county surveyor were arched. The county surveyor (Mr. Cory) replied in the affirmative, and in answer to a further question said that some had parapets and some had not.

The Clerk of the Peace suggested that the surveyor might repair those which he considered to be bridges, and leave the others until some steps were taken by the parish surveyors either to repair them or proceed against the county for non-repair. It had always been a moot point as to what was a bridge, and how small it should be taken, and whether it should be arched or flat. There was a distinction between an ordinary culvert and a bridge, and ordinary culverts were not reparable by the county.

The surveyor said there was one only 3 ft. wide. He did not want to saddle the county with a lot of structures with which they have nothing to do; at the same time, he would not like to have the county indicted for not doing what was its duty to do. He had written to several neighbouring counties, to see on what rule they acted, and he had learned that in the North Riding they took nothing under 10 ft.; in Durham, they took nothing under 6 ft.; while in Northumberland, if it was arched they took it.

The Chairman.—I think that the example of Yorkshire is better than that of Northumberland.

Captain James.—Would it not be well to have a report from Mr. Cory as to the number of those places in dispute, and then come to a decision?

The Chairman.—We might authorise him now to take all those bridges about which there can be no possible question.

It was resolved, on the motion of Sir Henry Vane, that the surveyor take no bridges except such as he was sure were bridges.

COMMISSIONS.

Sir,—The recent discussion in the *Times* can hardly be less distasteful to the great body of architects, whether members of the Institute or not, than it is to those who are familiar with the practices of architects as a body, and who really know that they do not deserve the imputation which has been cast upon them. This is the experience of a firm that has never offered to pay commission to architects. We know nothing of the experience of those who do. If you will allow us to proffer a word of advice to those architects who are careful of their own reputation, and of the reputation of the body to which they belong, it is, that the utmost discouragement should be given to the employment of houses that are known to offer commission, and that architects should not generally recommend one house for a particular class of work to the exclusion of all others. Some architects we know refuse to recommend anybody at all; others give several names, leaving the client to choose. When they do not do one or the other, we find they generally pass all extra works through the hands of the builder or contractor, leaving him to levy his commission or deduct his discount as a matter of course.

Fredk. Edwards & Son.

Great Marlborough-street.

NORTHUMBERLAND AVENUE.

At the meeting of the Metropolitan Board of Works on the 19th ult., the Works Committee, reporting on a letter from the Royal Institute of British Architects, referring to clause 30 of the Charing-cross and Victoria Embankment Approach Act, and inquiring whether it is the wish of the Board to delegate to the Institute the power of controlling the architectural character and design of the buildings to be erected in Northumberland-avenue, or in what other mode the Board may desire to carry out the intention of the Act, recommended that a letter be addressed to the Institute, informing them that the Board have no power to delegate the control of the designs in question, but that it is their intention, in accordance with the provisions of the Act, to submit to the Institute elevations of the buildings to be erected in the avenue, before the same are commenced.

At a subsequent meeting of the Board (on the 26th ult.) a letter was read from the Institute, stating that they had no idea of interfering with the ultimate control vested in the Board over the architectural treatment of the buildings to be erected in Northumberland-avenue. They thought that the requirements of the Act would be met if the approval or disapproval of the Institute was formally confirmed by the Board of Works. The only object of the Institute was to prevent public disappointment in the carrying out of an Act intended to secure an artistic treatment of a noble thoroughfare. The letter was referred to the Works Committee.

EVANS & SWAIN'S FIREPROOF CONSTRUCTION FOR FLOORS, CEILINGS, AND ROOFS.

At the present moment we may be of service to some of our readers by directing their attention to a mode of construction patented by Messrs. Evans & Swain.

The patentees take ordinary timber joists of any uniform depth, generally 9 in. or 11 in. for ordinary floors and spans up to 25 ft., but deeper where greater span or strength is required, and of any thickness (the thinner the better, as there is less chance of shrinkage and an open joint being formed). These joists they place on the walls in the ordinary way, only, instead of fixing them, as is usual in constructing an ordinary floor of wood joists and boards, with a space between the joists, they are placed together without any intervening space. The ends of the joists are allowed to bear on the walls in the usual way (only no plate is required), and the last joist at each end of a series of joists is also allowed to bear throughout its whole length upon the walls. The sides of the joists are brought into intimate contact by being bolted up close at intervals with screw-bolts, or spiked together with strong spikes, or screwed with ordinary screws, or any other similar method; and the result is a solid slab or floor of timber of the size of the room, bearing on the walls on all four sides, of great strength, and exerting no outward thrust upon the walls.

A floor thus constructed would, in itself, be nearly perfectly fire-proof, but, as an additional protection, the inventors bring to their aid the fire-resisting properties of common plaster. After the floor has been constructed, as above described, and a solid slab of wood formed, the inventors drive, at close intervals, into the under surface of the floor forming the ceiling of the room below, a number of flat-headed nails; this forms a key for the plaster, and the ceiling is then plastered in the ordinary way, with a good thick coat of common plaster, care being taken to use a tough plaster that will not shrink and crack, rather than a hard and brittle one.

Under ordinary circumstances, it is only necessary to plane off the top surface of the joists, no flooring-boards or other covering being required; but, if the floor above is intended for the storage of highly inflammable goods, such as oils, spirits, varnishes, or paraffin, it is advisable that the upper surface of the floor should be floated with cement, or covered with stone or tiles, or some other similar material.

For roofs they would construct a floor of solid timber as before described, and then cover the upper surface with either cement, asphalte, tiles, stone, or any other material, laid on a coating of loam and sand or fine concrete.

It is obvious that such floors must be costly; but the inventors claim that, "taking into consideration the saving effected in the whole building, by the roof and the use of thinner walls, it will be found that this system, though offering security from the spread of fire, is very little, if at all, more costly than any other system of fire-proof construction in use." Anyhow, it deserves to be looked into.

Sanitary Institute of Great Britain.—We are asked to say that this Institute proposes to hold a public meeting, early in March next, at the Society of Arts, to consider the report recently issued by the committee appointed by the President of the Local Government Board upon the modes of treating town sewage. The Duke of Northumberland will preside, and the discussion will be opened by Sir Joseph Bazalgette.

GRANITE BUILDING.

SIR,—If I reply to Mr. Trickett's letter in the *Builder* of Jan. 20, I fear it will only be to reiterate what I have already said. I will, therefore, be as brief as possible in answering him, and in other respects will make my letter as interesting as possible to such of your readers as take an interest in this—as I think it—important question.

In the *Builder* of Dec. 16, 1876, you allowed me to use these words:—"Where rain has access to it (*i.e.* polished granite), it is as clean as anything can be in this mundane city that does not receive constant attention. Under cornices or other projections the polish is temporarily deadened; and it would, of course, be well if owners or tenants would have these parts washed with a sponge occasionally, which is all this hard unabsorbent material requires." And I go on to say that the cleaning down of stonework is, as we all know, a much more difficult and expensive operation.

In his last letter, Mr. Trickett, after mentioning some examples of granite-work that are "begrimed with soot," says of the Scottish Widows Insurance Office, Cornhill,—"Not so the red Peterhead granite, which stands out prominent and beautiful."

After this confession, which is good evidence *from the other side* in favour of my proposal, and the existence of a dozen other similar examples in this city which any one who will take the trouble may see for himself in half an hour, I must demur to Mr. Trickett's assertion that "soot and dirt do speedily eat out the colour of granites." There could not be a more decided proof that this effect will not ensue than the present state of the Duke of York's Column, in Carlton Gardens, which, although it was never polished, yet, after fifty years' exposure, shows its red colour as well as on the day it was finished, and is otherwise in a state of perfect preservation. Messrs. Macdonald, of Aberdeen, tell me that the oldest work done by their father before them shows no sign of change.

It is quite true, as most practical men know, that fire is an enemy to granite; but practical men also know, firstly, that granite or stone is only used as a thin external casing to the thick walls of a building; and secondly, that fires—generally soon extinguished—are internal. It is, therefore, probable that the heat would not be sufficient to damage the casing. Moreover, if we except theatres, when did we last hear of an important public building being burnt down? I do not, then, as an architect, think this a serious objection to granite as a building material, especially when the other advantages I have urged, are taken into account.

I observe Mr. Trickett says that a stone building that has been exposed years to London soot, will, when cleaned down, contrast favourably with polished granite. All I can say on this point, and many of my professional friends agree with me, is that I never yet saw a stone building that had been cleaned down that would not have been better left untouched. The only exception is the Buxton Memorial, the very elaborate work of which seemed to render it more suitable for the operation.

With regard to the economy of using the sand-blast, Mr. Newton's lecture, some months ago, at the rooms of the Society of Arts, convinced me and others. Specimens of sunk work in hard materials were exhibited, which have been executed by this process in a fraction of the time they would have taken if done by hand.

Knowing and respecting Mr. Trickett as a fairly independent man, still, he is a stone merchant, and I should, therefore, scarcely have appealed to him on this subject and expected a perfectly unbiassed opinion. He deals in granite, I believe, but it is only to a very limited extent. We all remember his useful and excellent samples of freestones at the late International Exhibition, but he sent no specimens of granites. No: his heart evidently prefers to soar among limestone mountains, dolomite ranges, and sandstone cliffs, than to descend to the volcanic rocks below,—cold now, but once, ages ago, a fiery lava-stream. It is just these ancient fires, however, that have given us the materials we want. It is the igneous character of granite that makes it everlasting, even in the London atmosphere. In fact, experience shows that only through the agency of fire can we have permanent buildings. It is the firing that makes the manufactured materials,—majolica, encaustic tiles, glass, and terra cotta,—everlasting, or more or less durable; and it is perhaps a little singular that the three first, which, like granite, could not exist without the agency of fire, are just those that, having a bright surface, would harmonise best with polished granite work, if used for the ornamental details.

Thus, it is the agency of fire alone that will enable us to combat with success those unseen, but powerful and ever-active enemies in the air that are constantly attacking and ruthlessly destroying our costly and beautiful buildings of perishable stone. I venture, then, to assert that if our future public buildings were cased with granite they would be supplied with a suit of armour at once invulnerable and beautiful, and that a style worthy of this scientific age would be established.

ARCHITECT.

INTERFERENCE WITH STREET LEVELS.

FULHAM BOARD OF WORKS *v.* METROPOLITAN DISTRICT RAILWAY.

THIS case was heard on the 17th ult. It was an appeal, by the defendant railway company, from an order made by Vice-Chancellor Bacon on the 13th ult., granting an injunction to restrain the company from interfering with the levels of certain streets in Hammersmith, which are crossed by a new line of railway which the company are constructing.

The streets in question are the Broadway, the Grove, and Bradmore-lane. The company are making the level of the new line in some places as much as 2 ft. 3 in. above the level shown in their original plans, their reasons for doing so being to obtain a better fall for the drainage of the line. They contend that they have power by their Act to deviate to the extent of 2 ft. in a vertical direction, and this was ultimately admitted to be so. The question, therefore, was whether the excess of 3 in. was one which the Court would interfere to restrain. The Vice-Chancellor had granted the injunction. The company appealed.

Lord Justice James said the Court, as at present advised, were of opinion that the company were clearly going beyond their Parliamentary powers in deviating beyond 2 ft. from the originally intended level of the railway. The Court were also clearly of opinion, so far as it was proper to express an opinion upon an interlocutory motion, that the company had a right to deviate to the extent of 2 ft. Then the question to be considered was, what the effect of the excess of 3 in. in deviation was. It appeared that that excess did not exist at the points where the railway crossed the Broadway or Bradmore-lane, but only at the point where it crossed The Grove. It was quite clear that all the evidence as to damage which would be caused by an alteration of the levels of the streets was adduced with reference to the original contention of the plaintiffs that the company were not entitled to deviate at all from their originally contemplated level, and there was really no evidence before the Court to show that any damage would be caused by the additional deviation of 3 in. There was nothing to show that this would cause the slightest inconvenience to any human being. Of course this view of the case might be altered at the hearing of the action, but in this state of things, looking at the balance of convenience and inconvenience, it would be far more convenient that the company should be allowed to proceed with their works. The motion must stand to the hearing.

Lord Justice Bramwell and Lord Justice Amphlett concurred.

A CAUTION.

PLEASE allow me to caution benevolent architects and others against an impostor of French or German extraction, named De Barry. He called here with a letter, said to be from Mr. Pearson, of Harley-street, strongly recommending him as an object for charity. He tells a long story, and is anxious to display a crippled knee.

I told him to call again, and wrote at once to Mr. Pearson, who in reply states he knows nothing whatever about the man.

JOHN OLDRID SCOTT.

Spring Gardens.

*** The same man came to us last week, and we were nearly imposed on by the sight of Mr. Pearson's letter,—not quite. The letter certainly seemed to us to have been written by Mr. Pearson, and was on his "headed" note paper.

"LODGING MONEY" FOR BUILDERS' WORKMEN.

BRODERICK *v.* HODGSON.

THIS was an action (brought in the Darlington County Court, before Mr. E. R. Turner, judge) to recover the sum of 5s. 3d.

The plaintiff is a plasterer, and the defendant a builder in Darlington, and the question involved was whether a builder was liable to pay lodging money for men when working out of town.

Plaintiff stated that he was employed by the defendant to do some work at Brusaleton Bank. He received his money at Shildon. He had only come into the town the previous day, as he was on the tramp. The defendant paid his fare down to Shildon, and it was the custom when a workman was sent into the country for the master to pay lodging-money. It was also the custom for the master to pay lodging-money, even on the first job the man did for him.

A man named Wood stated that he was being paid 3s. a week lodging-money at the same work. He had a wife and a house in Darlington, and had always received his lodging-money whenever he was sent out of town.

His Honour.—But you have a home?

Witness.—I do not think that makes any difference; employers do not ask questions as to whether you are married or single. He continued that he had been in many parts of the country, and had always received his lodging-money. He was never asked if he had a home before he was allowed extra money.

The rules of the Plasterers' Society were put in, but the judge said they were not binding upon the master, and on the question of custom ruled against the plaintiff, and said such a custom was only intended to meet the case of a man who had a home in the town from which he was sent.

He gave judgment for the defendant, with costs.

WOODEN HOUSES.

SIR,—In reply to "S. M. P." respecting wooden houses, I respectfully submit the following information. It is a common thing to build such houses in America. In Chicago alone there are hundreds built and shipped to various parts of the world; and it has been my lot during the last six years to superintend the erection of a considerable number of them. As to their being substantial, I have no hesitation in saying that they are far more so than 75 per cent. of the brick houses building at present in this country. I know numbers of "frame houses," as they are called, that have been built more than half a century, and are still good. They are as warm and comfortable as any brick house, while they do not cost anything like the price; and I have no doubt but the plan would succeed, providing there was sufficient energy to carry it out.

G. A. K.

BOARD SCHOOL, KEYMER, SUSSEX.

SIR,—We remark that in your notice of the above you mention that it is heated by "Bacon's high-pressure hot-water apparatus," a term that, we fear, may mislead some as to the nature of our system, and cause them to confound it with the old "high-pressure" apparatus, which is so often and deservedly condemned. Although our apparatus is based on the same fundamental principles, we have by careful study and attention entirely removed all the objections that could be raised against the old plan, having by the means of properly-proportioned and well-constructed furnaces reduced and equalised the heat of the pipes, thus avoiding all smell; and by thorough attention to the laws of expansion and friction reduced the pressure to little more than that resulting from the height of the system and the temperature of the pipes.

J. L. BACON & Co.

IRON AND GAS TAR.

SIR,—Sir E. Beckett, in his interesting book on Building, says (p. 127),—"Gas-tar, I understand, rusts iron very quickly instead of preserving it." Is this true? I shall be sorry if it is, since for some time I have been in the habit of having my sheets, pipes, and railings painted with gas-tar.

THORNE.

PROBATIONERS AT THE ROYAL ACADEMY.

SIR,—I should like to bring under the notice of your readers, and especially such of them who may contemplate entering the architectural school of the Royal Academy, that out of fifteen sets of drawings presented in December last by would-be probationers, fourteen were rejected. The reason of this large proportion of failures cannot be far to seek; and one would like to know, on competent authority, whether it arose from want of merit in the drawings submitted, or neglect to observe some one or more of the rules,—though the latter suggestion seems beside the question, if we are to accept the assurance of the unsuccessful fourteen that they faithfully observed the rules supplied,—rules, it is said, precisely like those under which former candidates have been successful.

G. K.

Premature Occupation of Houses.—The *Sanitary Record* reports that some time ago in an application for interdict of occupation made by the Local Authority of Glasgow, against the proprietor of a new property in Lumsden-street, the defender pleaded that he had in the interval remedied the defects complained of, and a remit was made to the medical officer of health, to report. This report was to the effect that the room was still uninhabitable on account of the dampness of the plaster. The Court, thereupon, on the application of defender's agent, made a further remit to Mr. Bromhead, architect, who reported that the room was unfit for human habitation, and that probably "three weeks with a fire would be certain to make it habitable and dry." Sheriff Spens delivered an interlocutor, in which he "finds that the defender's agent states that a fire has for the last ten days been kept in said room, during which it has not been inhabited, and that he also undertakes that it shall remain uninhabited for eleven days from the date thereof, which undertaking the petitioner's agent expresses himself satisfied. Further order unnecessary. Respondent liable in expenses."

Books Received.

Amongst Machines: a Book for Boys. By the Author of "The Young Mechanic." Trübner & Co. 1876.

The difficulty of knowing what sort of book to choose for a boy is much more frequently admitted than overcome. Boys themselves read "light" literature on the sly, but their dignity suffers if anything inferior to universal science or a journey round the world be offered for their acceptance. Some subject of an unusually heavy character, and bound in an equally heavy manner, is therefore the ordinary present selected, quite as often by the boy who receives, as the senior who gives; and when the former is a senior himself, he perhaps reads it. Although "Amongst Machines" may be advantageously studied by readers of all ages, and even classes, it is essentially a boy's book; and, although there are many people, especially in the little world of artists, who would, if they could, ignore machinery altogether,—who teach the rising generation that England was merry only when time, money, and hand-labour were slowly spent for the exclusive benefit of the few, and that the present age of machinery is the absolute destruction of real art for the use and edification of the many. But the power which has brought with it so much that is said to be fatal to art, has occasioned an extraordinary increase and spread of petty objects which, in many circles, are common adjuncts of comfort, and even in humble ones are now necessities. The author's reminder that "a native Hindoo," though an eminently better artist than his British fellow-subject, can produce only an infinitesimally small quantity of work compared with the rough and ungentle machine-made products, is a platitude which will bear repetition; but pray is the "native Hindoo" a different sort of mortal to the ordinary Hindoo? For if so, it is likely that the native Englishman claims precedence or *vice versâ* over those of his countrymen to whom the adjective is not applied. Let that pass, however; the book is systematically put together and well illustrated with good practical details of machinery and manufacture. First principles are noted, mechanical powers are described, then mechanical arrangements, and afterwards the application of the same. The story of iron furnaces and other things to be seen in the black country is interesting; and the reader is treated to a graphic description of how pens, pins, and hair-pins are made, of glass-making and wood-cutting, together with views and explanations of printing and paper machines. The last chapter gives the greatest machine of all,—the human frame. So appropriate a wind-up to a tale of artificial life tempts us to recall that "Book of the Machines," which a venturesome traveller to Erewhon found in the College of Unreason,—a delightful satire which Mr. Samuel Butler imagined and Messrs. Trübner & Co. published. The Erewhonian youth were grounded in the study of "Hypothetics," and forbidden to learn anything about machines. These had been abolished after a long civil war, lest the development of mechanical consciousness should lead ultimately to the supersession of human labour. Fragments of ancient machines were collected in the museums much in the manner of geological specimens at the present moment; and the naked, unaided hand triumphed. "Amongst Machines" tells a different story, and its author is doubtless justified in saying that the existing patent laws do not suffice to protect the inventor; the object of a patent is to secure all profits to the inventor for a term of years; the result, on the contrary, frequently shows the inventor impoverished and his luckier neighbours enriched. We fancy, however, to have sometimes heard a similar indictment of results among crafts and communities who, free of all patents, and innocent of any kind of monopoly, enjoy liberty in admired disorder.

The Aquarium: its Inhabitants, Structure, and Management. By J. E. Taylor, F.L.S., F.C.S. Hardwicke & Bogue. 1876.

The fate of spelling-bees, rinks, manufactured "antiques," and "old" china is probably of a transient character; and although the last-named has been loftily called by an artistic authority good investment, it is much to be questioned whether the greater number of plates, saucers, and "batteries" generally will be worth much some twenty years hence, when the century is dying out. Mr. Taylor very justly urges that such will not be the fate of aquaria, and most people will agree with him. True, they do in some instances deprive the inmates of a room from complete enjoyment of the house opposite; and they prevent the insertion of heads and shoulders between the sill and the sash of a window; but while they afford pleasure in private, they are sources of public education. Developed into an exhibition, they are useful for scientific research, and a nursery for the microscope. The "Jardin d'Acclimatisation," in the Bois de Boulogne, has the honour of having first opened, in 1861, a large aquarium, to which the Parisians were attracted with difficulty. In the same year the well-known Barnum contrived to get two white whales, which he exhibited alive in his notorious museum; and this was the first American aquarium show. Since then aquaria have spread from house to house and town to town, and now a watering-place which pretends to any fashion puts the aquarium into the category of public buildings, as an indispensable adjunct of progress and speculation. Mr. Taylor's work is full of excellent illustrations, and will be found useful as a handbook of varied and exhaustive information upon all matters referring to aquaria, both large and small.

Gold. Translated from the German by Mrs. Brewer, with Notes by Mr. Edwin W. Streeter. Chatto & Windus. 1877.

This is a book of "for and against"; and a careless reader may lose the path which leads through it, and which is guarded at both ends by Mr. Streeter. The question discussed in large type over some 135 pages is, whether "the precious metals which in a definite purity form the material of a nation's currency should receive any warranty or not when used as an article of commerce." Herr von Studnitz wrote a book to show that they should not; and the part interesting to the English reader has been translated and abridged. He applied to every Government for information concerning the laws and regulations in force, as well as the legal changes which had been effected in the course of ages, and the result is an interesting compilation of historical data. It may be useful to say that "standard" is the term used to express the relation between pure gold in coins or precious metal goods and the alloy with which it is mixed. The degrees of standard were formerly expressed in the case of gold "by carats (the dried kernal of the locust bean), of which in Germany twenty-four were called a mark. . . . . Twenty-four carat gold was of absolute purity. . . . . And in England this manner of determining the standard quality of gold is still in use." An abridgment is given of the laws of all nations concerning the standard of gold and silver wares; and Herr von Studnitz maintains that the experience of countries and periods has pronounced against the interference of the State. The history of the laws connected with the precious metal industry in those lands where the State has interfered with its course shows that they are gradually becoming less strict; and he looks forward to the emancipation, in the German empire, of the precious metal industry. Mr. Streeter finds fault with the German author; and, as the former has "exhibited publicly a collection of genuine Hall-marked articles which presented almost every variety of ingenious deception," he would take from the Goldsmiths' Company the privilege of testing ware made of the precious metals,—a privilege which they have held since the year 1300. He would have all articles containing less than twelve-carat gold sold as metal, and he would strive to introduce the standard of eighteen-carat gold. It is a readable book; and a disinterested conclusion may be arrived at by the indubitable assumption that both Mr. Streeter and Herr von Studnitz have uttered truths, even though they contradict each other.

VARIORUM.

The fourth edition has been published of "Spon's Architects, Builders, and Contractors' Pocket Book," edited by Mr. W. Young. It is full to the edge of valuable information.——Messrs. Cassell, Petter, & Galpin are reproducing for circulation in this country Knight's valuable "Dictionary of Mechanics," which, as issued from the American press, met with a highly favourable reception in the United States. The work is being issued here without alteration, and in the form in which it was published in America.——The *Leisure Hour* gives us a paragraph on "Brain and Iron":—"Of an earlier period than Nasmyth, who also worked in the shop of Maudsley & Field, was Joseph Clements. Of him it has been said that he constructed such machinery that 'he made iron think.' If our readers have been into a great smith's shop, they have seen, most probably, a beautiful tool, cutting a long narrow ribbon of iron with its keen tooth. This is work which is usually superintended only by a lad; it superseded the old rugged method of chipping and filing. This was the invention of Joseph Clements—a marvellous stride of simplicity, accuracy, and beauty in almost all departments of iron work. The mathematical accuracy of Clements was so great that Professor Babbage sought him out to construct his famous Calculating Machine, an apparatus intended to calculate with unerring accuracy, acting so perfectly, that when, through any cause, an error has been made, the machine actually reverses itself, and, to use Dr. Smiles's expression, 'rubs itself out.' The machine was never finished in England; it was reserved for Sweden to produce it. Messrs. Scheutz, of Stockholm, completed this extraordinary combination of what has been called 'thinking iron,' from the drawings of Babbage and Clements, and it was first displayed at the Paris Exhibition of 1855."——The last number of "Old and New London" speaks of Notting-hill:—"Notting-hill is said to derive its name from a manor in Kensington called 'Knotting-Barnes,' or 'Nutting-Barnes,' sometimes written 'Notting,' or 'Nutting-barnes,'—so, at least, writes Lysons, in his 'Environs of London.' He adds, that the property belonged formerly to the De Veres, Earls of Oxford (which would naturally be the case, as it formed part of Kensington parish and manor); and subsequently to Lord Burleigh, who, as we have already seen, lived at Brompton Hall, not very far from the neighbourhood of Kensington. In Robins's 'History of Paddington,' we read that the 'manor of Noting barons, *alias* Kensington, then Nutting Barns,' afterwards called 'Knotting-barns,' in Stockdale's new map of the country round London, 1790; 'Knolton Barn,' now 'Notting-barns,' was carved out of the original manor of 'Chenesitun.' From an inquisition taken at Westminster, in the reign of Henry VIII., it appears that 'the manor called Notingbarons, *alias* Kensington, in the parish of Paddington, was held of the Abbot of Westminster as of his manor of Paddington by fealty and twenty-two shillings rent'; but since the time of the Reformation 'Notting-barns' seems to have been considered a part of Kensington. Notting Barns Manor was held successively by the De Veres, and by Robert Fenroper, alderman of London, who exchanged with King Henry VIII. It was afterwards granted to Paulet, Earl of Wiltshire, from whom it passed to Lord Burghley. The manor was next held by the Copes, Andersons, and Darbys, and in 1820 it was owned by Sir William Talbot. Down to a very recent period, much of the district through which we are about to pass bore rather a bad character for thieves and housebreakers, and was somewhat noted for its piggeries and potteries; but these have all been swept away by the advancing tide of bricks and mortar. The 'potteries' are still kept in remembrance by Pottery-lane, in which is the Roman Catholic Church of St. Francis of Assisi, referred to in a previous chapter. The ground about Notting-hill lies high, and the soil is a stiff clay, while that of Kensington proper is chiefly sand and gravel; but in reality Notting-hill forms part and parcel of Kensington itself, which stretches away some distance northward in the direction of Kensal-green."——"The Classified Directory to the Metropolitan Charities, 1877," is published by Messrs. Longmans & Co. The advantage claimed for the arrangement is that the benevolent can thereby easily select the most suitable institution for any person whom they may wish to benefit. The editor in his preface gives the income of the charities for 1875, as amounting to 4,114,849*l.*, and that the total spent in charity in the metropolis may be put down as between six and seven millions.——"The Architect's Almanac" for 1877, a neat quarto card, published by Messrs. Wyman & Sons, presents on the reverse a number of tables useful for occasional reference in an office.——With such a good summary of all the news of the week, and comments thereon, for *a penny*, as the *Weekly Dispatch* gives, no one need remain ignorant of what is going on the world around him. It is very well conducted.

Miscellanea.

The Decay of the City Guilds.—On Monday night, at the meeting of the Social Science Association, Mr. Adolphe Smith read a paper "On the Decay of the City Guilds." Mr. Leonard H. Courtney, M.P., presided, and there was a full attendance. The reader said the eighty-nine companies enjoyed between them at least 1,000,000*l.* per annum, and of this sum only about a tenth part was under the control of the Charity Commissioners. What was done with the remaining 900,000*l.* income? This wealth, derived in a great measure from the unearned increment accruing from landed property, was daily increasing. On the expiration of a lease, the Cordwainers' Company, for instance, had but recently increased one of their yearly rentals from 250*l.* to 500*l.* With one or two exceptions, this wealth was held by secret self-elected bodies who had nothing whatever to do with the special trades to which the legatees had left their property. If a Royal Commission were appointed with power to enforce the attendance of witnesses, it would be discovered, among many other similar and even worse instances, that a certain Company contrived to give fifty dinners over the selection of a set of furniture. The Chairman having invited discussion, Mr. Walford said that Mr. Smith had not correctly described the objects and the action of these guilds. They had trained skilled artisans, promoted good feeling among the brethren of the crafts, fostered commerce, promoted art, and used their political power for the public benefit. Having done all this, it did appear to him somewhat ungracious to find fault with the guilds, when after their labours they were, so to speak, resting on their oars. Mr. Toker, of the Ironmongers' Company, said that a great part of the income of that Company was spent upon education. They had between 1,200 and 1,300 schools in England and Wales. The Chairman said he was favourable to such an inquiry as had been proposed. It would dispel many illusions, and enable the question to be dealt with either by the Legislature or the Courts, in a just and equitable manner, while at the same time preserving ancient bodies, who had done good suit and service.

Fall of Scaffolding.—On Tuesday morning a serious accident occurred on the premises of the City Commissioners of Sewers, in Commercial-road, Lambeth. For some time past Lett's Wharf has been the scene of extensive building operations, the Commissioners erecting a large series of buildings for the sorting and storage of dust and refuse. The main building was completed, and the shaft of the furnace was in course of erection, with the scaffolding around and above it. At the time mentioned a great number of dust-sorters, men and women, were at work in a yard adjoining the new works, when suddenly the rain came down with such violence that they flocked under the scaffolding for shelter, and at that very moment the whole of the shaft and timber surrounding it was blown over by a rush of wind, and came crashing down upon the poor unfortunate people, three of them being to all appearance killed; but it was subsequently ascertained that only one had been killed outright, although two more of them are so much injured in the spine that their recovery is impossible. The City Surveyor for the southern district and the surveyor for the parish of Lambeth found that the scaffold had become strained by the gale on Monday night, and that the momentary hurricane which swept over the metropolis at 10.15 had snapped one of the standards and hurled the whole to the ground.

Wanted, Lectures on Art Collections.—The *Staffordshire Advertiser* notices a new loan to Bursiem, by the authorities of South Kensington Museum, of pictures and miscellaneous objects coming under the designation of industrial art, and says,—"We are satisfied that well-intentioned as is this system of loans, its educational value will continue to be trivial until arrangements are made for addresses, by competent persons, on the objects exhibited. This is done at many of the museums on the Continent, and the practice is not wholly, though almost, unknown in this country. Those who have had the good fortune to hear Professor Rudler talk, *con amore*, not officially, to a party of visitors on the splendid collection of minerals at the Jermyn-street Museum, have heard a model address of this kind. Why should not the committee of the Wedgwood Institute set an example to the trustees of the British Museum?"

The Society of Telegraph Engineers.—On Wednesday, the 24th ult., an ordinary general meeting of this society was held at the Institution of Civil Engineers, Great George-street, Westminster. Professor Abel, F.R.S., the new president, delivered his inaugural address, in which he pointed out the great advantages telegraphy had derived, and was still deriving, from the science of chemistry, by a reference to the late Professor Mathiessen's investigations into the purity of copper. The presence, even to the smallest extent, of any impurity in that metal had been proved to have a most material effect against its perfect employment in telegraphy. That statement, however, must be qualified in some measure, for although even 5 per cent. of lead in the copper diminished its conducting power from 93 per cent. down to as low as 5 per cent., it has been found that by melting copper with a small proportion of lead or tin, its conductive power was greatly increased, for the lead or tin took away the oxygen of which it was very difficult to clear the copper, and analysis of the copper so treated showed scarcely a trace of those metals after the oxygen had been got rid of. After a few passing remarks on the subject of iron and steel wire as connected with telegraphy, the Professor referred to the action of decay observable in the timber and other plant used in telegraphy.

The American Slate Trade.—The *Mining Journal* learns from New York that the slate business in the Lehigh Valley never had a better outlook than at the present time. The export of slate to foreign countries is increasing. From the port of New York large shipments were made between December 5 and 16. During the time mentioned there were shipped to England, Ireland, and Scotland 2,143 cases of school slate and 515 tons of roofing slates. Taking that as an average shipment for the year, we have 47,717 cases of school slates, and 10,746 tons of roofing slate, equal to about 32,238 squares, and this vast amount is sent to the British Isles alone, from whose extensive quarries all kinds of slate were some years ago shipped to almost every nation in Europe. Should this foreign demand continue to increase in the same proportion it has for the last three years it will absorb every square of slate and every case of school slate that can be produced in the United States with the present facilities. This foreign demand will, therefore, necessitate a largely increased production for the supply of the home trade.

What a Plant did.—A little plant was given to a sick girl. In trying to take care of it the family made changes in their way of living. First, they cleaned the window, that more light might come to its leaves; then, when not too cold, they would open the window that fresh air might help the plant to grow. Next, the clean window made the rest of the room look so untidy that they used to wash the floor and walls and arrange the furniture more neatly. This led the father of the family to mend a broken chair or two, which kept him at home several evenings. After the work was done he stayed at home, instead of spending his leisure at a tavern, and the money thus saved went to buy comforts for them all. And then, as the home grew attractive, the whole family loved it better than ever before, and grew healthier and happier with their flowers. Thus the little plant brought a real as well as a physical blessing. We get this from the New York *Sanitarian*; but it originated in England some time ago.

A Buried City.—A communication from Geneva states that at Clèves, in the Grisons, a company of shareholders is at present being formed for excavating on the site where formerly stood Plurs, a flourishing town and the centre of an important transit trade, which was covered on the 18th of August, 1618, by a fall of rock. The catastrophe cost the lives of 930 persons, and 203 houses were destroyed. There were several rich churches in the place, and at the time of the terrible event one of them was filled with a congregation at their evening devotions. There were also some silversmiths' shops and others for copper utensils.

The St. Gothard Tunnel.—M. Favre, who is conducting the works in the St. Gothard Tunnel, under contract, has intimated to the St. Gothard Railway Company that unless guarantees are forthcoming for funds sufficient for the prosecution of the enterprise, he must suspend the works. It is expected that the International Conference, which will meet shortly, will provide the required guarantees.

St. Werburgh's Tower, Bristol.—Sir Gilbert Scott has given 10*l.* to the fund for the preservation of the tower of St. Werburgh's Church, Bristol. Sir Gilbert writes:—"The tower is most beautiful in architectural design, and highly picturesque in its combination and grouping with other objects; and its destruction would stamp indelible disgrace upon the authorities of the good and famous city of Bristol, handing down their names to all future generations as unworthy holders of authority, which they abuse to the injury of the city they represent."

A New Fort.—It is stated that plans have been prepared for a new fort to be constructed near Walton Ferry. Harwich harbour is already defended at its entrance by Landguard Fort on the one hand and the redoubt at Harwich on the other hand; while on the shore at Shotley, where the estuary divides into the river Orwell and Stour, and at Walton, on the left bank of the Orwell, there are Martello towers. By the erection of the fort now projected, a complete quintette of fortifications, covering the estuary from every point, will be secured.

Stall-Board Plates.—The brass stall-board plates of Messrs. Dyson & Co., of Pitfield-street, Hoxton, are well known and appreciated. The firm, however, have recently effected a considerable improvement. The background of the letters has heretofore been worked with a diamond pattern; it is now ornamented with small upright flutes which allow the wet to run off at once. The dust, too, in summer is consequently more easily removed. The lettering of some specimens we have recently examined is bold and well formed.

New Stock Exchange for Liverpool.—The committee of the Liverpool Stock Exchange recently invited a number of architects to submit designs for the erection of a new Stock Exchange, which it is proposed to build on the property adjoining Queen-buildings, Dale-street, recently purchased on behalf of the members of the Exchange. Several architects submitted designs, and we (the *Daily Post*) are informed that the first premium of 100*l.* has been awarded to Mr. Henry Sumners, architect. The second premium of 50*l.* was awarded to Messrs. H. & A. P. Fry.

The Late Mr. William Young.—We are informed that a number of gentlemen are actively engaged in the endeavour to raise a fund for providing assistance to the children of the late Mr. Young. A preliminary meeting is to be held at the office of Mr. T. Roger Smith, 23, Bedford-street, Strand, on Monday next, at three p.m.; and all those who take an interest in the matter are invited to be present.

The Surrey Gardens.—The *South London Press* states that the freehold of the Surrey Gardens is sold to an eminent firm of South London builders, and ere long the famous place of recreation, where Jullien, and wild beasts, and fireworks once held undisputed possession, will be covered with bricks and mortar.

Steam for Tramways.—A steam engine was used for the first time on the 24th ult. in drawing tram-cars through the crowded streets of Sheffield. The tramways there are about to dispense with the whole of their horses, and to adopt steam as the motive power. The steam-engine is said to make no noise, and to consume its own smoke.

Mycenæ.—According to the *Times* correspondent, Dr. Schliemann has discovered the mouth of a double circular necropolis at Mycenæ, and has found in a tomb four golden vases 18 centimètres high, richly ornamented; also, two golden signet rings, one representing a palm-tree and seven figures of women.

Bramhall Hall.—It is reported that this ancient mansion, with the land belonging to it, has been sold to a building company for the sum of 200,000*l.* It is to be hoped that the mansion will be preserved.

Society of Engineers.—The first ordinary meeting of the Society for the year 1877 will be held on the 5th of February next, when the president, Mr. Thomas Cargill, will deliver his inaugural address.

Carisbrooke Castle.—The *Whitehall Review* directs the attention of the First Commissioner of Works to Carisbrooke Castle, and says that a portion of the fabric is becoming sadly dilapidated.

TENDERS

For the erection of the new wing of the General Hospital, Nottingham. Messrs. T. C. Hine & Sons, architects:—

Hodson & Facon	£8,329 0 0
Tutin	8,033 0 0
Daubney	8,025 0 0
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Stevenson	7,798 0 0
Messom	7,725 0 0
Lynam	7,620 0 0
Wood & Son	7,571 14 0
Jelly	7,423 0 0
Marriott & Walmesby	7,420 0 0
Bell & Son	7,346 0 0
Vickers (accepted)	7,310 0 0
Hind (withdrawn)	6,555 0 0

For re-seating new vestry and new gallery to Holy Trinity Church, Forest-row, Sussex. Mr. Herbert J. Green, architect. Quantities by Mr. Samuel Tucker:—

Waters	£1,151 10 6
Charlwood	973 0 0
Morris	905 0 0

For rebuilding No. 20, West-street, Brighton, for Mr. G. J. Lem. Mr. Lainson, architect. Quantities by Messrs. Fowler & Hugman:—

	No. 1.	No. 2.
Chappell	£4,265 0 0	£3,977 0 0
Cheesman & Co.	4,080 0 0	3,800 0 0
Barnes	—	3,630 0 0
Howard	—	3,590 0 0
Nash & Co.	3,988 0 0	3,688 0 0

For a villa residence at Hove, West Brighton. Mr. Lainson, architect. Quantities by Messrs. Fowler & Hugman:—

Nash & Co.	£5,598 0 0
Barnes	5,534 0 0
Howard	5,290 0 0

For rebuilding No. 65, High Holborn. Mr. C. Herbert Shoppee, architect:—

Drew (accepted)	£2,280 14 0

For villa residences, Clyde-road, Addiscombe, for Captain Turner. Mr. George Loe, architect:—

Marriage (accepted)	£1,620 0 0

For the erection of a block of warehouses, Carter-lane and Bell-yard. Mr. George Vickery, architect:—

Dove Brothers	£15,575 0 0
Scrivener & White	15,197 0 0
Browne & Robinson	15,063 0 0
Morter	14,926 0 0
Brass	14,859 0 0
Hart	14,700 0 0
Crabb	14,461 0 0
Newman & Mann (withdrawn)	13,661 0 0
Sharman (withdrawn)	13,000 0 0

For alterations and additions to premises, Knightrider-street. Mr. George Vickery, architect:—

Crabb (accepted)	£2,700 0 0

In the list of tenders for works for the London General Omnibus Company at Bromley, for "Mason," read *Mason & Bristy*; whose tender has been accepted.

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